The Heating and Ventilating Magazine

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New Tests of Automatic Ventilators

An Investigation of 22 Commercial Types, with Comparative Data on Plain Stationary, Stationary Siphoning, Plain Rotary and Rotary Siphoning Types.

By

Professors J. P. Calderwood and A. J. Mack

Professor and Associate Professor, Respectively, of Mechanical Engineering, Kansas State Agricultural College

COMMERCIAL ventilators may be divided into a number of different classes dependent upon their design. In this investigation* they were divided into four classes—plain stationary, stationary siphoning, plain rotary, and rotary siphoning. The turbine type ventilators, included in this investigation, were few in number and since their effectiveness was within the range of the rotary siphoning group of ventilators they were included in this group.

The plain stationary type of automatic ventilator makes no special provision for utilizing the wind velocity in producing additional draft. Examples

*Reported in the Kansas State Agricultural College Bulletin, Vol. IX, No. 3.

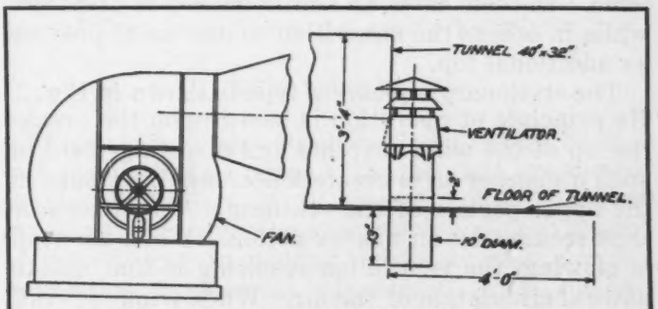

Fig. 6. Arrangement of Test Equipment

PREVIOUS preliminary tests upon three different types of automatic ventilators were conducted by the Engineering Experiment Station of the Kansas State Agricultural College during 1919 and 1920 and were reported in THE HEATING *and* VENTILATING MAGAZINE *for October, 1920, and April, 1922. For the present tests the laboratory equipment was enlarged and 22 representative ventilators were secured. The test results are presented in groups, depending upon the type of ventilator. Manufacturers whose products were submitted for testing, include the following:*

Acme Ventilator Corp., Boston, Mass.
Allen Air Turbine Ventilator Co., Detroit, Mich.
American Cornice Works Co., Wichita, Kan.
American Ventilating Co., Pittsburgh, Pa.
Arex Company, Chicago, Ill.
Geo. W. Brooks, Topeka, Kan.
Burt Manufacturing Co., Akron, Ohio.
Decatur Cornice Works, Albany, Ala.
Geo. W. Derrick & J. L. Childers, Tulsa, Okla.
Edwards Manufacturing Co., Cincinnati, O.
Globe Ventilator Co., Troy, N. Y.
Paul R. Jordan & Co., Indianapolis, Ind.
Kernchen Co., Chicago, Ill.
Thomas Lee, Cincinnati, O.
Merchant & Evans Co., Philadelphia, Pa.
Milwaukee Corrugating Co., Milwaukee, Wis.
Ohio Body & Blower Co., Cleveland, O.
H. H. Robertson Co., Pittsburgh, Pa.
Royal Ventilator Co., Philadelphia, Pa.
Spencer Sheet Metal Works, Cheyenne, Wyo.
B. F. Sturtevant Co., Boston, Mass.
Ven-Air Ventilator Co., Kansas City, Mo.
Western Sheet Metal Works, Wichita, Kan.

Fig. 1. Types of Automatic Ventilators Classified as Plain Stationary

of such ventilators are shown in Fig. 1. This type consists simply of a cap above the ventilator pipe which prevents the direct entrance of rain or snow and is made storm-proof by means of a circular band. In some cases an additional top is provided, while in others the band is so shaped as to provide an additional top.

The stationary siphoning type is shown in Fig. 2. Its principle of operation is based upon the breaking up of the wind currents and directing them in such a manner as to create a decreased pressure in the upper portion of the ventilator. Ventilation is thus secured by an ejector action. When no wind is blowing, the ventilation resulting is that due to natural circulation of the air. When winds prevail the siphoning action is established and additional ventilation results.

The plain rotary type, Fig. 3, consists chiefly of an elbow or its equivalent, which is supported upon a vertical shaft. The position of the elbow is regulated upon the principle of the weathervane. The opening from the ventilator, consequently, always points away from the direction of the wind. This ventilator makes use of the slight vacuum produced by the wind in the production of additional draft.

The rotary siphoning type is shown in Fig. 5. It has, in addition to the principle embodied in the plain rotary type, a feature similar to that used in the stationary siphoning ventilators. The air is directed by flutes or vanes so that an injector action is established, thereby increasing the velocity through the ventilator. In some cases, the ejector is placed within the ventilator, while in others it surrounds the ventilator.

TEST EQUIPMENT

One fact very noticeable in conducting these tests is that the effectiveness of the average ventilator is seriously affected by small disturbances. This fact was first encountered in a wind tunnel of large proportions placed outside the building. The results obtained were erratic, and inconsistent. This, no doubt, was due, to a large extent, to a combination of natural and artificial winds. The natural winds, over which there was no control, were variable in velocity and direction and it was almost impossible to obtain true wind velocities. Also, due to the arrangement of the equipment, there was undoubtedly an appreciable temperature difference between the air in the tunnel and that induced through the ventilator.

It was, therefore, decided that more consistent results could be obtained by placing the tunnel inside a building. Consequently, a wind tunnel approximately 3 ft. square and 16 ft. long was first constructed. In one end of the tunnel was placed a variable speed fan capable of producing wind velocities up to 11 miles per hour. At the other end, just beyond the sides and top of the tunnel, a pipe, 10 in. in diameter, which protruded about 2 in. above the tunnel floor, was placed to receive the ventilator. The floor of the tunnel extended 4 ft. lengthwise beyond the sides and top of the tunnel. Fig. 6 shows the arrangement of test equipment.

The wind tunnel with its fan was placed in the mechanical engineering laboratory, the volume of which was large enough to eliminate all perceptible drafts caused by the fan. The temperatures of the air in the tunnel and that in the room were equal, so that all effects from natural ventilation were eliminated. Honeycombed screens were placed within the tunnel to produce parallel currents of air and to create a more uniform velocity over the tunnel section.

All the ventilators tested were of the same commercial size. The diameter at the base was 10 in. This dimension was selected as being fairly representative of the ventilators used in practice, and this size made possible the investigation without necessitating a large tunnel.

METHOD OF TEST

In establishing a method of procedure in conducting these tests, it was decided that the per-

Fig. 2. Types of Automatic Ventilators Classified as Stationary Siphoning

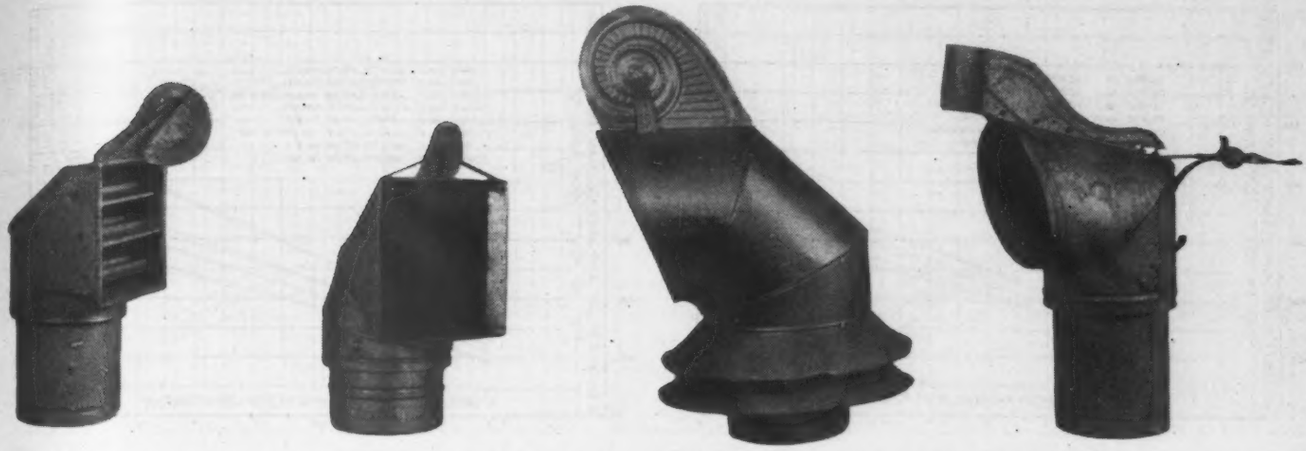

Fig. 3. Types of Automatic Ventilators Classified as Plain Rotary

formance of the wind in inducing a current of air through the ventilator is the important factor. Also, it was thought desirable to secure data upon the advantages of the various types of ventilators and to ascertain, if possible, what principles of design should be incorporated to secure the most efficient ventilator. The investigation, accordingly, was limited to these phases of the subject.

In conducting the tests, a ventilator was placed over the pipe at the end of the tunnel and the speed of the fan regulated to produce the desired wind velocity. The air from the fan was forced through the tunnel toward the ventilator, thus creating a region of slight pressure near the ventilator which tended to force air down through the ventilator rather than induce a current up through it. Readings of the wind velocities in the tunnel and of the air induced through the ventilator were taken by means of an anemometer. The wind velocity in the tunnel was taken as the average of the velocities measured at various points in a vertical plane near the ventilator to be tested. The velocity of the air induced through the ventilator was measured by inserting the anemometer in the short vertical pipe underneath the tunnel floor. Data were also secured of the air induced through the ventilator pipe when no ventilator was inserted in the tunnel. In this latter case a straight section was added to the receiving pipe, the end of which terminated near the center of the tunnel. The results in this latter case are referred to and recorded as No Ventilator.

Fig. 4. Turbine Type of Automatic Ventilator. Ventilators of This Type Were Classified as Rotary Siphoning

TEST RESULTS

(Figs. 7, 8, 9 and 10 showed the design of the various ventilators tested.) The test data are shown graphically in Figs. 11, 12, 13 and 14. Fig. 15 shows graphically the average effectiveness of each group of ventilators. In making up the average curves, ventilators number 5B, 6B and 8D were not included as they were only in the experimental stage and quite out of range in effectiveness with ventilators of similar classes.

INTERPRETATION OF THE RESULTS

As judged from the results of these tests, it appears that a slight gain is made by those ventilators which utilize the wind to better advantage. In the order of their effectiveness are the rotary siphoning, the plain rotary, the stationary siphoning and the plain stationary. The average effectiveness of the various groups of ventilators is shown graphically in Fig. 15.

In order to determine what effect the siphons have upon the operation of the ventilator, a special investigation was made. Representative ventilators from the stationary siphoning group were selected and subjected to test. With the siphons stopped, readings were taken of the wind velocity and that of the air induced through the ventilator. Three of the four ventilators gave better results with all siphons open, one gave better results with all siphons closed. All four ventilators gave better results with siphons closed on the windward side, the siphons on the leeward side being open. These results indicate that the siphons assist slightly the effectiveness of the ventilator in some cases.

Tests were also made on two rotary siphoning ventilators to determine if siphons were of any advantage to them. In both cases slightly better results were obtained when the siphons were open

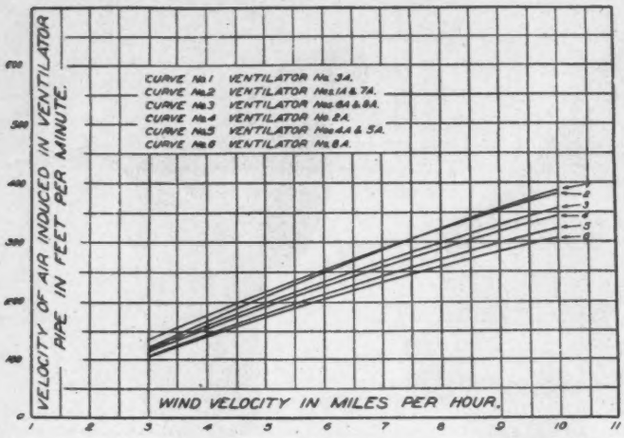
VELOCITY OF AIR INDUCED IN VENTILATOR PIPE IN FEET PER MINUTE.
CURVE No.1 VENTILATOR No. 3A.
CURVE No.2 VENTILATOR Nos.1A & 7A.
CURVE No.3 VENTILATOR Nos.6A & 9A.
CURVE No.4 VENTILATOR No. 2A.
CURVE No.5 VENTILATOR Nos.4A & 5A.
CURVE No.6 VENTILATOR No. 8A.
WIND VELOCITY IN MILES PER HOUR.

Fig. 11. Curves Showing the Effectiveness of the Ventilators Classed as Plain Stationary

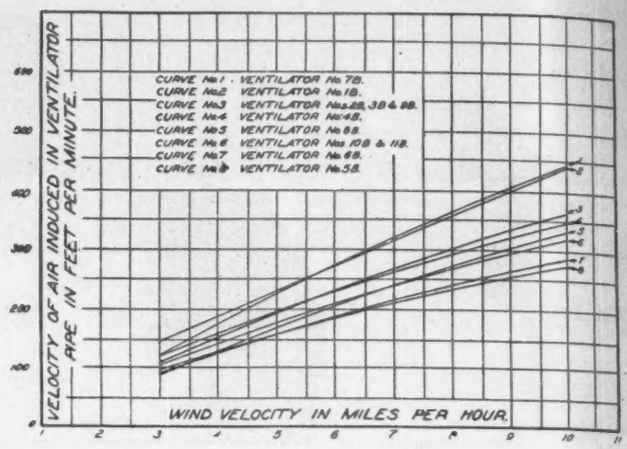
VELOCITY OF AIR INDUCED IN VENTILATOR PIPE IN FEET PER MINUTE.
CURVE No.1 VENTILATOR No. 7B.
CURVE No.2 VENTILATOR No. 1B.
CURVE No.3 VENTILATOR Nos. 2B, 3B & 9B.
CURVE No.4 VENTILATOR No. 4B.
CURVE No.5 VENTILATOR No. 8B.
CURVE No.6 VENTILATOR Nos. 10B & 11B.
CURVE No.7 VENTILATOR No. 6B.
CURVE No.8 VENTILATOR No. 5B.
WIND VELOCITY IN MILES PER HOUR.

Fig. 12. Curves Showing the Effectiveness of the Ventilators Classed as Stationary Siphoning

than when blocked. The increased effectiveness of the rotary siphoning ventilators over the plain rotary, however, lies chiefly in construction. In the main, they were so constructed, that the path of egress of air had no obstructions or sharp turns. The projected area was also enlarged resulting in increased suction. These facts were also taken advantage of in the case of the most effective plain rotary ventilator.

It is a well-known fact that abrupt turns decrease the velocity of moving air. The principle seems to play an important part in automatic ventilators. Ventilators whose inlet pipes projected above the bottom of the storm band ranked uniformly low in effectiveness. This is especially noticeable in the plain stationary group. In order to verify this conclusion tests were made on two different plain stationary ventilators, one being a commercial ventilator with a 4½-in. storm band while the other was one especially constructed with a 22-in. storm band.

The results indicated that any unnecessary extension of the ventilator pipe above the bottom of the storm band reduces its effectiveness. A part of this loss is undoubtedly due to restriction of effective area especially in the case of the ventilator with the 4½-in. storm band. The ventilator with the 4½-in. storm band is sold commercially with the ventilator pipe projecting 1¾ in. above the bottom of the storm band. Its effectiveness could be increased as much as 20% by lowering this pipe.

A decrease in the effectiveness of a ventilator is to be expected by the introduction of resistance. A slight decrease in efficiency is noted in those ventilators with an inverted cone or other peculiarly constructed top. Similarly those ventilators which are equipped with shutters have their effectiveness decreased in proportion to the obstruction such shutters produce.

The results of this investigation seem to indicate that the most effective action in inducing air through a ventilator is the vacuum produced in the wake of the wind. Those ventilators which showed marked effectiveness in these tests took advantage of this principle. Those ventilators which presented a large obstruction to the wind, other factors being the same, gave better results.

BASIC PRINCIPLES OF VENTILATOR DESIGN

Probably the greatest contributing factors to the effectiveness of automatic ventilators are:

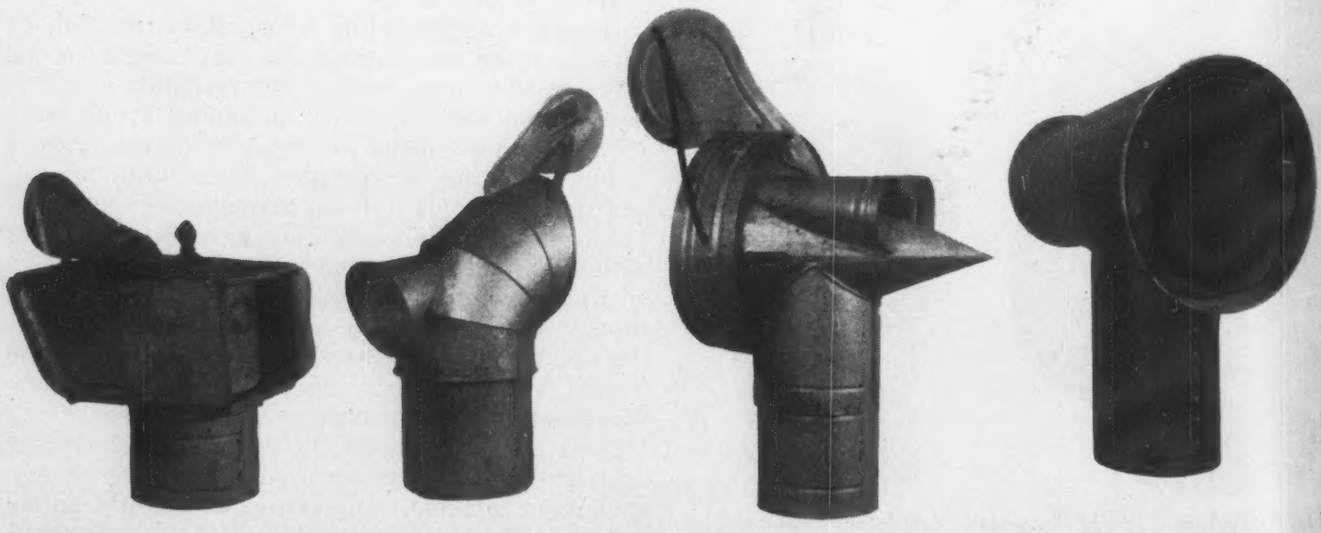

Fig. 5. Types of Automatic Ventilators Classified as Rotary Siphoning

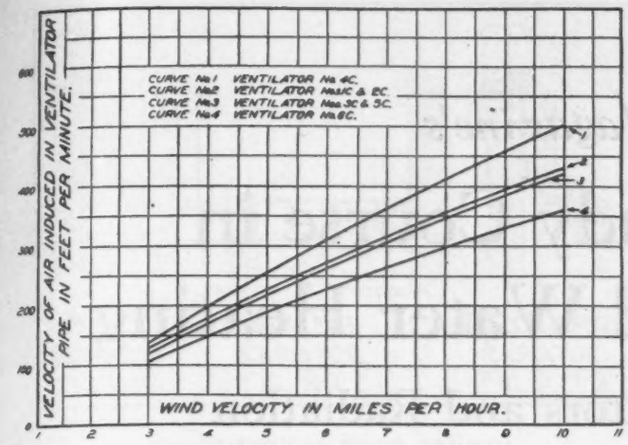
CURVE No.1 VENTILATOR No.4C.
CURVE No.2 VENTILATOR Nos.1C. & 2C.
CURVE No.3 VENTILATOR Nos.3C. & 5C.
CURVE No.4 VENTILATOR No.6C.
VELOCITY OF AIR INDUCED IN VENTILATOR PIPE IN FEET PER MINUTE.
WIND VELOCITY IN MILES PER HOUR.

Fig. 13. Curves Showing the Effectiveness of the Ventilators Classed as Plain Rotary

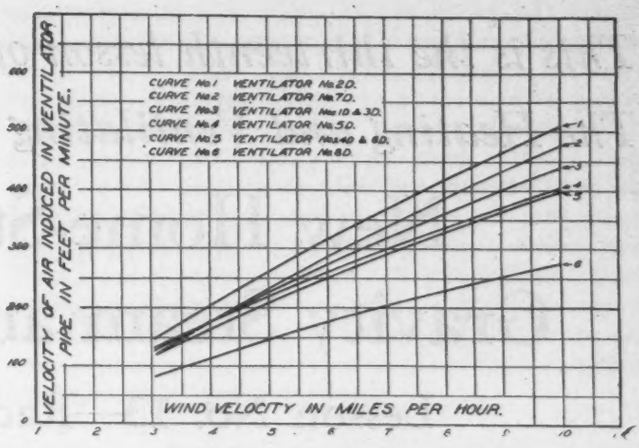
CURVE No.1 VENTILATOR No.2D.
CURVE No.2 VENTILATOR No.7D.
CURVE No.3 VENTILATOR Nos.1D. & 3D.
CURVE No.4 VENTILATOR No.5D.
CURVE No.5 VENTILATOR Nos.4D. & 6D.
CURVE No.6 VENTILATOR No.8D.
VELOCITY OF AIR INDUCED IN VENTILATOR PIPE IN FEET PER MINUTE.
WIND VELOCITY IN MILES PER HOUR.

Fig. 14. Curves Showing the Effectiveness of the Ventilators Classed as Rotary Siphoning

1. Large projected area exposed to the wind. A large area produced a larger low pressure area and a better exhaust.

2. Ample area of the exit passages. The area for the passage of the air leaving the ventilator should be at least as large as the cross section area of the inlet pipe. In the case of the stationary types of ventilators, the area should be larger, as most of the exhausted air passes out of the ventilator on its lee side when the wind is blowing.

3. Preventing the entrance of wind. Air which enters the ventilator must be exhausted and unless provision is made for the removal of this additional air or the preventing of its entrance, the capacity of the ventilator is proportionately decreased.

4. The straightness of the path of egress of the air. Abrupt turns in the passage of the air introduce friction. The path of the outgoing gases should be as nearly straight as possible. If turns are necessary, they should be smooth and well rounded.

5. The freedom of obstructions in the path of egress. The effectiveness of a ventilator may be materially lowered by obstructions. They should, consequently, be eliminated to the greatest possible extent.

6. Making use of the vacuum created by the wind. Any provision whereby the vacuum created by the wind is increased or made more effective will produce added ventilator effectiveness.

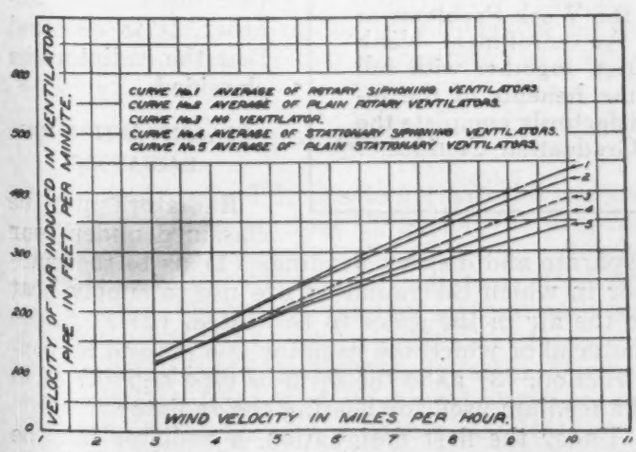
CURVE No.1 AVERAGE OF ROTARY SIPHONING VENTILATORS.
CURVE No.2 AVERAGE OF PLAIN ROTARY VENTILATORS.
CURVE No.3 NO VENTILATOR.
CURVE No.4 AVERAGE OF STATIONARY SIPHONING VENTILATORS.
CURVE No.5 AVERAGE OF PLAIN STATIONARY VENTILATORS.
VELOCITY OF AIR INDUCED IN VENTILATOR PIPE IN FEET PER MINUTE.
WIND VELOCITY IN MILES PER HOUR.

Fig. 15. Curves Showing the Average Effectiveness of the Various Classes of Ventilators

New London Office Building Heated Entirely by Radiation from Concrete Floors and Walls

Articles have appeared from time to time in THE HEATING AND VENTILATING MAGAZINE, describing a method of heating in vogue in England, by which hot water is circulated through a network of piping carried in the concrete floors and ceilings. In one of the newest London office buildings, that of Messrs. Thomas Cooke & Son, Ltd., this interesting method of heating has been used. The grid of heating pipes is laid in the earliest stages of building construction, within the forms for the concrete floors, and acts, in a sense, as a metal reinforcement. Wall panels between windows and in other exposed locations are also included in the plan; all office piping being imbedded in the walls. Proper circulation is secured by an electric motor-driven pump. It is apparent that the British heating engineers are quite enthusiastic over this method of heating, and anticipate that it will become a recognized practice in the British Isles. It must be admitted that it does away with ugly exterior piping and radiators, and in this respect at least, the practice is commendable. As to the life of the installation and the freedom from trouble, there is an open question that only time will settle.

American Public Health Association Condemns Mechanical Ventilation

On another page of this issue we publish the remarkable resolution adopted by the American Public Health Association on the subject of Mechanical Ventilation of School Buildings.

It is unnecessary to state that the passage of this resolution creates a situation which strikes at the very root of the science of mechanical ventilation and requires quick and adequate attention on the part of all having at heart the best interests of the industry.

This is the thirteenth lesson of

The Heating and Ventilating Magazine's

New Home-Study Course in Gravity Steam and Water Heating

Lesson No. 13—Radiators and Radiation

By Ara Marcus Daniels

EDITOR'S NOTE:—*This is the opening lesson of the section of the Home-Study Course which is devoted to Radiators and Radiation. It will be presented in three parts, appearing in this and the two succeeding issues.*

IN ORDER that the air in an enclosed space may be maintained at a desired temperature, there must be as many heat units introduced into the space during a unit of time as pass, during the same time, to the outside where the temperature is lower. The student should review the second lesson of Part I, "Fundamentals of Heating" and thereby refresh his memory on the principles of the transfer of heat.

When a room or building is heated by means of radiators there are three distinct steps that occur during the process. They are (a) the heat contained in the steam, water or other heating media passes to the inner surface of the radiator through contact of the media and surface, (b) the heat passes through the walls of the radiator by conduction (See the first lesson of Part 1, "Fundamentals of Heating") and (c) the heat is given off from the outer surface by radiation and convection in the case of direct radiation and practically entirely by convection, only, for indirect heating.

The size of the radiator required or, as it is more generally termed, the amount of radiation required is expressed in square feet of radiating surface. This surface is the area of the outer surface of the radiator with which the air of the room may come in contact. Every square foot of surface of a given type or form of radiator under definite conditions of installation will give off or emit heat units at a definite rate.

In preceding lessons of this course, in which it was necessary that the student know the amount of radiating surface used in the various water heating designs, it was always stated by assuming that the proper-size radiators had been previously determined. In this section, the student will be familiarized with the different types of available radiators, taught how to calculate required radiation, to locate it properly, and how different conditions of installation affect heat emission. Before considering these factors and their effect upon one another, it is essential that the radiators be classified.

Instruction available to subscribers only. The first lesson appeared in November, 1924, but students can enroll at any time. Immediately upon enrollment, Lesson 1 will be sent you, together with the Work Problems pertaining to that lesson. Full directions will be included as to where to send solutions of the Work Problems.

The complete course consists of 30 lessons. They are divided into sections. Lessons 6 to 11 just completed, are devoted to water heating. Ensuing lessons will cover radiators and radiation, gravity steam heating, steam and water boilers and cost estimating.

Price of course complete, with copies of text and problem sheets in convenient loose-leaf form, arranged by colors for different parts, and fully indexed for cross reference, $100.00, payable in equal monthly installments of $10.00. This includes a critical analysis of the Work Problems as solved by each student. An enrollment blank will be sent you upon request, together with full directions for securing all the benefits of the instruction. Students who satisfactorily complete the course will be awarded a Graduation Certificate.

CLASSIFICATION OF RADIATORS

Radiators may be classified under four separate and distinct headings (1) as to the manner in which the radiators are use to supply heat to the air in the space to be heated, (2) as to the material of which the radiator is built and its construction, (3) as to the form or type and (4) as to the medium used for heating the radiator.

Under the first designation, a radiator may be used to heat the air in a given space (a) by direct radiation, (b) by indirect radiation and (c) by

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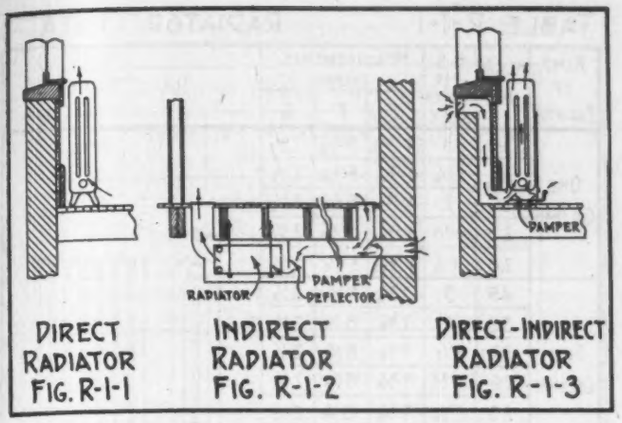


Arrangements of Direct Radiators

direct-indirect radiation. When the process is by direct radiation, the radiator is located within the space to be heated and is thereby surrounded only by the air within the space. An example of a direct radiator is shown in Fig. R-1-1.

When indirect radiation is used, the radiator is not located in the room to be heated but at some convenient place from which the heated air from the radiator is carried by convection or by fan or blower pressure through a duct to the room and is delivered through a floor or wall register. Fig. R-1-2 illustrates the manner in which indirect radiators are often installed in residential work. This class of radiation, therefore, may be arranged so as to recirculate inside air, introduce all outside air or proportions of each. Ventilation means are thereby possible with radiation so installed.

When direct-indirect radiation is employed for residential work, a ventilating radiator is used. Such radiators consist of a regular column direct radiator with a base-box fitted under and to it. The base-box contains two dampers, front and rear; the front damper opens into the room through which air in the room may enter, pass up through the radiator and be re-heated, while the rear damper, opening into a wall duct, permits outside air to enter, become heated as it passes up between the radiator sections for delivery into the room. The opening in the outside wall is fitted with louvres and screens to prevent entrance of dirt, insects and water. A radiator of this form is shown in Fig. R-1-3. Thus air may be supplied for ventilating purposes when required or by closing the outside opening, the radiator may be operated as a direct radiator.

Work Problem R-1-1

Under the second designation (material and construction), there are four divisions, (a) cast-iron radiators, (b) pressed-steel radiatiors, (c) pipe-coil radiators and (d) tubular radiators. Cast-iron radiators, as their name implies, are cast with wall thicknesses of ¼ to 5/16 in. in different forms covered in detail under the third designation. Pressed-steel radiators consist of sheet-steel plates pressed and welded together by a double seam to form a column. The columns are riveted one to the other to form the radiator. Pipe-coil radiators consist of a series of 1-in. pipe (as the standard) united into a header or headers. Coils are sometimes built up of 1¼ or 2-in. pipe. Such radiators are used for direct radiation mainly in shops and factories. Their unsightliness makes them undesirable for other direct or direct-indirect work. While they have, in the past, been used for indirect and fan systems of heating, many engineers are now abandoning them in favor of units of the tubular type. Tubular radiators are built up of seamless copper tubing in different forms and so arranged as to provide a maximum of heating surface. They are fast becoming popular in connection with fan-blast and air-conditioning systems.

Work Problems R-1-2 and R-1-3

Under the third designation (form or type) there are many divisions possible, the principle of which are (a) floor radiators, or those with legs for standing on the floor, (b) wall radiators, or those built for attaching to the wall and (c) ventilating type radiators, or a radiator so built that air entering from below must pass to the top of the sections before it can leave the radiator.

Work Problem R-1-4

Floor-type radiators are available in many patterns, plain and artistic. Fig. R-1-4 illustrates one,

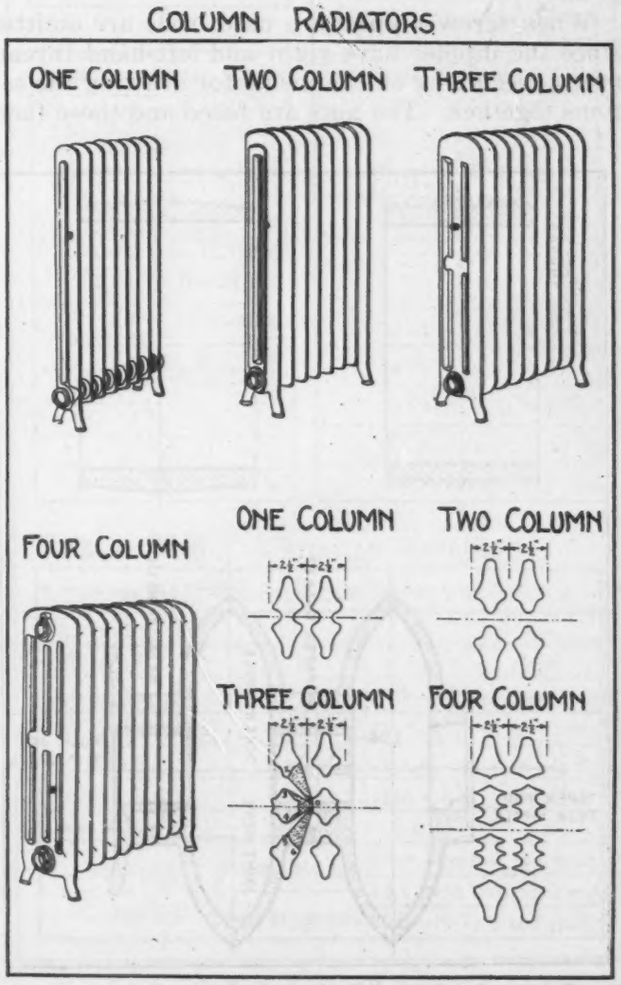


Fig. R-1-4. Column Radiators

two, three and four-column radiators, a column of a radiator being an element of which a radiator section is composed. Each of the cross-section views in the lower right part of Fig. R-1-4 contains two sections with the respective number of columns as noted.

Several sections when united form a radiator. Thus the three-column radiator, shown in Fig. R-1-4, is designated a 9-section 3-column floor radiator. The end sections have legs and hence are denoted as leg sections; the intermediate sections are called loop sections.

Work Problem R-1-5

The sections of cast column radiators are connected by mild-steel or malleable push or screw nipples through which the heating medium may circulate from one to the adjoining section. Fig. R-1-5 illustrates the two types of nipples used, separately and when in place. The malleable nipple, not being subject to corrosion, is generally preferred to the steel nipple, although the malleable nipple is subject to defects in casting. When push nipples are used between sections, two to four rods are provided for holding the entire radiator as a unit, the end sections at top and bottom having a web cast between the columns. This web is drilled for the rods threaded at both ends for units with which the sections are drawn and held tightly together.

When screw nipples are used, rods are omitted, since the nipples have right and left-hand threads and a special lug on the inside for drawing the sections together. The nuts are faced and these faced

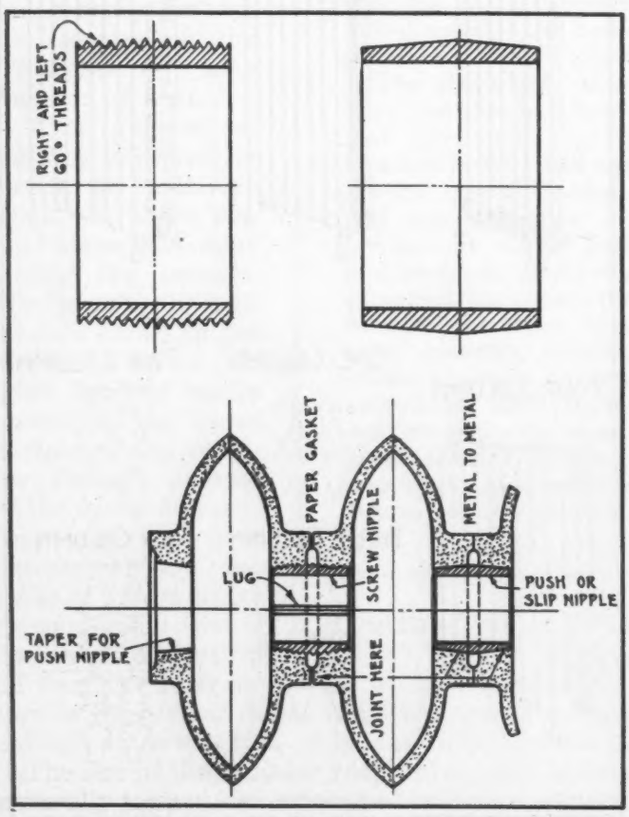
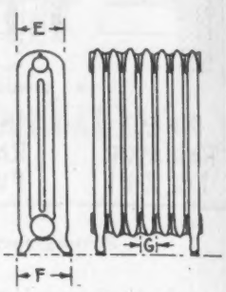


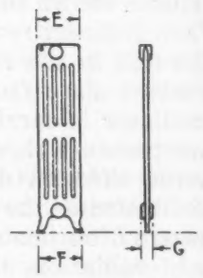
Fig. R-1-5. Screw and Push Nipples Used for Connecting Sections of Radiators

TABLE R-1-1 RADIATOR DATA

Kind of Radiator	Height Ins.	H.S. per Section Sq. Ft.	Measurements Inches E	F	G	Illustrated
One Column	38	3	4 13/32	5 3/8	2 1/2	
	32	2 1/2	4 13/32	5 3/8	2 1/2	
	26	2	4 13/32	5 3/8	2 1/2	
	23	1 2/3	4 13/32	5 3/8	2 1/2	
	20	1 1/2	4 13/32	5 3/8	2 1/2	
Two Column	45	5	7 3/8	8 1/4	2 1/2	
	38	4	7 3/8	8 1/4	2 1/2	
	32	3 1/3	7 3/8	8 1/4	2 1/2	
	26	2 2/3	7 3/8	8 1/4	2 1/2	
	23	2 1/3	7 3/8	8 1/4	2 1/2	
	20	2	7 3/8	8 1/4	2 1/2	
Three Column	45	6	9	9 3/4	2 1/2	
	38	5	9	9 3/4	2 1/2	
	32	4 1/2	9	9 3/4	2 1/2	
	26	3 3/4	9	9 3/4	2 1/2	
	22	3	9	9 3/4	2 1/2	
	18	2 1/4	9	9 3/4	2 1/2	
Four Column	45	10	10 1/2	11 1/4	3	
	38	8	10 1/2	11 1/4	3	
	32	6 1/2	10 1/2	11 1/4	3	
	26	5	10 1/2	11 1/4	3	
	22	4	10 1/2	11 1/4	3	
	18	3	10 1/2	11 1/4	3	
Hospital	45	5	7 3/8	8 1/4	3	
	38	4	7 3/8	8 1/4	3	
	32	3 1/3	7 3/8	8 1/4	3	
	26	2 2/3	7 3/8	8 1/4	3	
	23	2 1/3	7 3/8	8 1/4	3	
	20	2	7 3/8	8 1/4	3	
Window	20	5	12 1/2	12 1/2	3	
	18	4 1/2	12 1/2	12 1/2	3	
	16	3 3/4	12 1/2	12 1/2	3	
	13	3	12 1/2	12 1/2	3	
Corto	38	4 1/2	8	8 3/8	2	
	34 1/2	4	8	8 3/8	2	
	31	3 1/2	8	8 3/8	2	
	27	3	8	8 3/8	2	
	23	2 1/2	8	8 3/8	2	
	19 1/2	2	8	8 3/8	2	



COLUMN RADIATOR



CORTO RADIATOR

connections fitted with paper gaskets which provide an additional protection against water or steam leakage when the nipples are securely screwed in place. After assembling, the radiator should be tested to a pressure of 85 lbs. per square inch gage.

Work Problem R-1-6

Dimension and capacity data on radiators are most essential when planning an installation. Such data relating to column radiators built by one manufacturer are contained in Table R-1-1 in order to familiarize the student with the use and application of similar data contained in the hand catalogs of all who manufacture this class of material.

Work Problem R-1-7

Wall-type radiators, necessarily, fall into the one-column class since they are designed for the least practicable thickness. They are manufactured as a single unit casting in three sizes of 5, 7 and 9 sq.

TABLE R-1-2

PEERLESS WALL RADIATORS

TYPE	LENGTH INS.	WIDTH INS.	THICKNESS INS.	THICKNESS WITH BRACKETS, INS.	HEATING SURFACE
5-A	16 5/8	13 5/16	2 7/8	3 1/2	5 Sq. Ft.
7A - 7B	21 7/8	13 5/16	2 7/8	3 1/2	7 Sq. Ft.
9A - 9B	29 1/16	13 5/16	2 7/8	3 1/2	9 Sq. Ft.

Allow 1/2" for every bushing.
Allow 1 1/8" for each hexagon nipple used in assembly.
Radiators tapped 1 1/2" supply and return-bushed to suit.

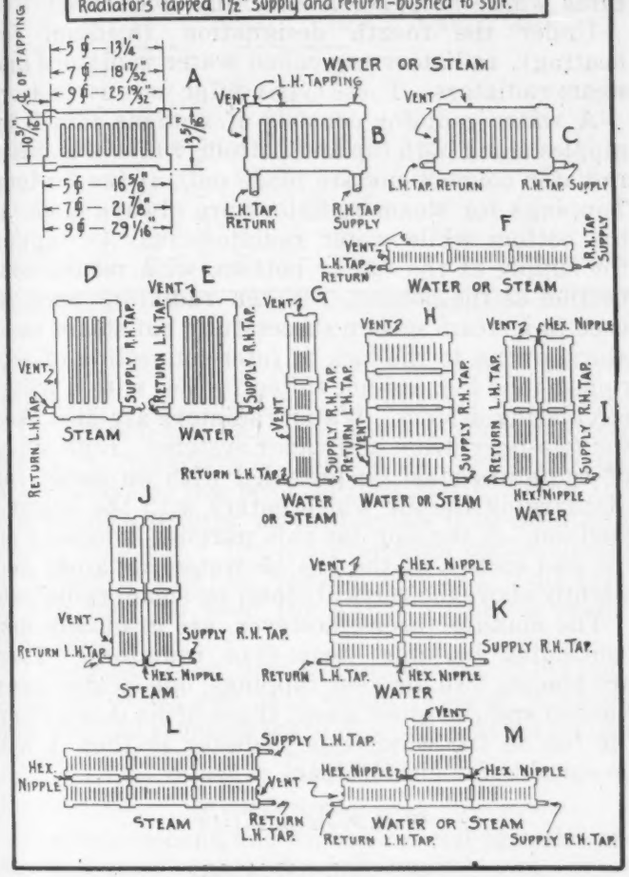


Fig. R-1-6. Wall Radiator (Peerless) Assemblies.
(Used with assigned problems R-1-8, to R-1-11.)

ft. of surface, respectively, or they may be obtained as assembled units having surfaces from 5 sq. ft. upwards, in multiples of 2½ ft. The various size units may be obtained in a variety of combinations to suit conditions calling for either a horizontal or vertical stack arrangement or as ceiling radiation.

Ratings and measurements of wall radiators of the unit-cast type are given in Table R-1-2 for one design and in Table R-1-3 for another design. Fig. R-1-6 shows the characteristics of the unit-cast type with a few of the possible combinations.

Work Problems R-1-8, R-1-9, R-1-10 and R-1-11

Similar information to that for the unit-cast type of wall radiator is given in Tables R-1-3 to R-1-6, inclusive, for the assembled unit section wall radiator built by another firm. The radiators illustrated in connection with these tables are built in two heights, 15 and 22 in. and may be obtained in any desired length in multiples of 2½ ft. of surface from 5 sq. ft. upward. All necessary dimensions are given to enable the student to determine the space requirements for any desired combination.

Work Problem R-1-12

In addition to the forms of radiators already mentioned, there are many so-called special radiators some of which are fast disappearing from the market. Special radiators include the bathroom radiator, the circular radiator, the corner radiator, column radiators without legs, single foot and extra high leg radiators, window radiators, hospital radiators, etc. Most of such types are illustrated in manufacturers' catalogs where dimension and capacity data are given. The student in heating and ventilating work should gradually accumulate for himself a file of manufacturers' catalogs and refer to them frequently. They contain a wealth of reliable and helpful information.

LOCATION OF TAPPINGS — X Supply-One pipe Steam; YZ Ret. & Supply, Water & Steam; W Air Vent Water; S Air Vent Steam; S-1 One pipe; S-2 Two-pipe

RADIATORS-1 TIER HIGH

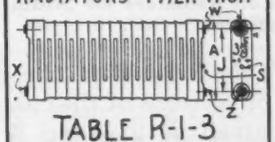


TABLE R-1-3

DIMENSIONS	15 In.	22 In.
A	14 9/16"	21 11/16"
J	11 9/16"	18 11/16"

RADIATORS 3 TIERS HIGH

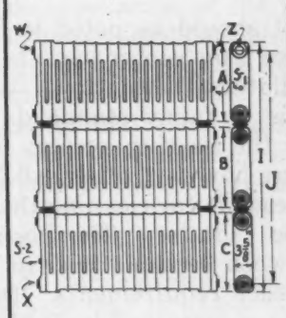


TABLE R-1-5

DIMENSIONS	45 INCH	52 INCH	59 INCH	66 INCH
	15	22	22	22
	15	15	15	22
	15	15	15	22
A	14 9/16"	14 9/16"	14 9/16"	21 11/16"
B	14 9/16"	14 9/16"	21 11/16"	21 11/16"
C	14 9/16"	21 11/16"	21 11/16"	21 11/16"
I	45 3/16"	52 5/16"	59 7/16"	66 9/16"
J	42 3/16"	49 5/16"	56 7/16"	63 9/16"

RADIATORS-2 TIERS HIGH

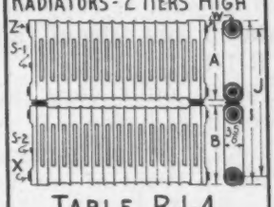


TABLE R-1-4

DIMENSIONS	30-In.	37-In.	40-In.
	15 15	15 22	22 22
A	14 9/16"	14 9/16"	21 11/16"
B	14 9/16"	21 11/16"	21 11/16"
I	29 7/8"	37"	44 1/8"
J	26 7/8"	34"	41 1/8"

TABLE R-1-6 REGULAR TAPPINGS

RADIATION SQ. FT.	ONE PIPE STEAM	TWO PIPE STEAM	WATER
30 and smaller	1 in.	—	—
31 to 59	1¼ in.	—	—
60 and larger	1½ in.	—	—
50 and smaller	—	1 in. x ¾ in.	1 in. x 1 in.
51 to 119	—	1¼ in. x 1 in.	1¼ in. x 1¼ in.
120 and larger	—	1½ in. x 1¼ in.	1½ in. x 1½ in.
AIR VALVE	⅜ in.	⅜ in.	⅜ in.
LOCATION OF TAPPINGS	Bottom - one end	1 Tier - bottom opp. ends	
	Must be specified	2,4,6 Tiers-T. & B. same end	
		3,5,7 Tiers-T. & B. opp. ends	

Fig. R-1-7. Wall Radiator (Princess) Assemblies
(Used with assigned problem R-1-12.)

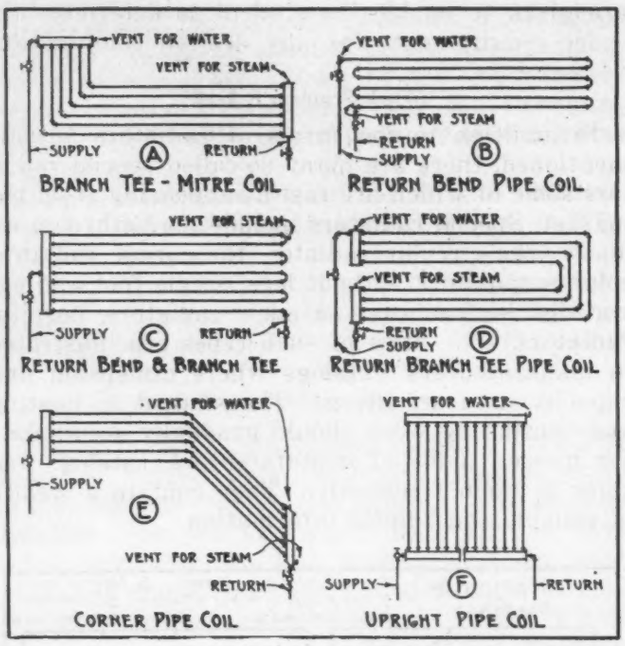


Fig. R-1-8. Examples of Pipe Coil Radiators for Steam and Water Radiation

It should be noted in Table R-1-1 that the distance from center to center of sections of the column radiators there shown is given as 2½ and 3 in. This is fairly standard. Specifications prepared for the heating system for hospitals and sanitariums, however, often call for a radiator that is more accessible for cleaning than is the standard column-type radiator. The hospital radiator, with 3 in. between sections instead of 2½ in. is supplied to fill such requirements. Data on this type of radiator are contained in Table R-1-1.

The window-type radiator is built very much lower than the regular column radiator. It may be obtained in the 5 or 7-column type and in various heights suited for installation in front of low window sills or under window seats. Data on this type are also contained in Table R-1-1.

Work Problem R-1-13

By special order, manufacturers will supply regular column radiators in various shapes or combinations. Circular radiators may be secured for placement around columns and corner, angle and curved radiators can be secured to fit into almost any corner or bay window. In placing orders for such, it should be accompanied by a template or sketch giving exact dimensions of the space to be occupied and area required.

Column radiators without legs are hung on the wall by means of special brackets. The bathroom radiator is fastened with lag screws or hooks. This radiator is especially suited to rooms where limited space is available and should receive consideration where a system is to be designed for modern bathrooms in hotels, apartments and similar structures where all space is carefully conserved.

Under the fourth designation (medium for heating), radiators are called water radiators and steam radiators. These types differ in construction.

A water radiator consists of sections joined by nipples along both top and bottom, while in a steam radiator connections are made only at the bottom. Tappings for steam radiators are always made at the bottom while water radiators may be tapped for supply at the top or bottom, with return connection at the bottom. Water radiators may be used in a steam system successfully but steam radiators, owing to the lack of inter-connection of sections at the top, are not suited for use with a water circulating system. Water radiators are also used for two-pipe steam and vapor systems. Both types of radiators must be provided with an outlet for discharging the air which enters with the heating medium. A tapping for this purpose is located on the end section at the top on water radiators and slightly above the vertical center on steam radiators.

The manufacturers, however, are gradually discontinuing building steam-type radiators. They are placing two air vent tappings, one located near the top and the other about three-fifths down from the top on the water-type radiator so that it will be suitable for either steam or water.

Work Problem R-1-14

PIPE COIL RADIATORS

While the use of pipe-coil radiators is limited, yet there are many in existence today and will continue to be used for direct radiation in factories, shops and similar buildings where their appearance is not objectionable. The student of heating, therefore, should have a general idea of their use, the names and arrangements of some of the different types of coils.

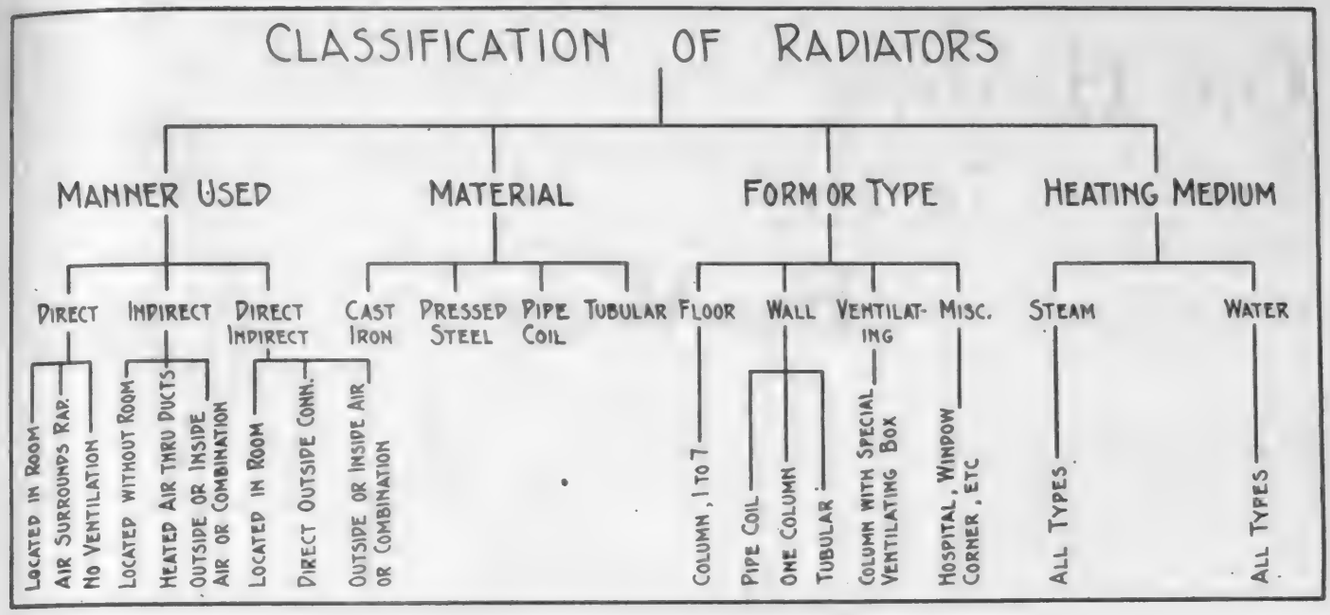
In Fig. R-1-8, six examples of coil radiators are shown, designating names being given under each illustration. All pipe-coil radiators in which steam will be used must have ample provision for expan-

TABLE R-1-7
WEIGHT OF RADIATORS
APPROXIMATE WEIGHT IN LBS. PER SQ. FT. OF SURFACE.

TYPE		LBS. PER SQ. FT.
COLUMN	STEAM	6½
	WATER	7
WALL		7½
CORTO		5¾
WINDOW (5-COLUMN)		7
OTHER DIRECT RADIATORS		6½
INDIRECT RADIATORS		5

TABLE R-1-8
CAPACITIES OF RADIATORS
(INTERNAL VOLUME)

KIND	PINTS (AV.) PER SQ. FT. SURFACE
CAST IRON COLUMN	1.5
CAST IRON WALL	1.65
PIPE, 1-INCH DIAMETER	1.0
PRESSED STEEL	1.0



sion. The branch-tee mitre coil is built of several lengths of pipe connected by right and left elbows to two branch-tees located in vertical and horizontal positions, respectively. Such a coil should always be installed in the position illustrated having the shorter pipe lengths vertical unless it be used as a ceiling radiator. The air discharge outlet should be placed to suit the heating medium. This type of coil may be used for either steam or water heating.

The return-bend pipe coil shown is not particularly suited for use as a steam radiator since its construction requires that the steam travel through the entire length of a single coil.

Work Problem R-1-15

The return-bend and branch-tee coil provide connections that enable the coils to fill with steam simultaneously and offers a very satisfactory type of coil for steam. This type is not so well suited to use with a water system.

The return branch-tee coil is well suited to positions where vertical wall space is limited. It is constructed by using two branch-tees with an equal number of right-hand elbows and right and left-hand elbows for connecting the pipes to respective outlets on the branch tees. This coil is equally well suited for steam or water heating when due attention is paid to locating the air vent.

Work Problem R-1-16

The corner pipe coil is for use as its name indicates while the upright coil is particularly suited for use as a hot water radiator.

Work Problem R-1-17

WEIGHTS AND INTERNAL VOLUMES OF DIRECT RADIATORS

Frequently it is necessary to know approximate weights and the internal volumes of various types of direct radiators. The volumes of radiators for water heating systems were touched upon in Lesson No. 5 of the Water Heating part. The student should refer to and note the application of the volumes there given. Approximate weights are essential in estimating freight and cartage charges. Data on these quantities are contained in Tables R-1-7 and R-1-8. With these tables and the student's work of the Water Heating part, no difficulty should be experienced in solving the following problem.

Work Problem R-1-18

Before proceeding to the consideration of the steps by which heat is transmitted to space to be heated when radiators are used and to the methods employed for calculating radiating surface required, the student should refer to Fig. R-1-9 in which the classification of radiators is charted. The various divisions discussed are there presented in graphical form for quick and easy reference.

Before proceeding further, the student should go back to the first part of this lesson and read it through carefully with Fig. R-1-9 before him and compare the chart with each of the groupings discussed. In this manner, a comprehensive impression of radiator classification will be made upon his mind.

FACTORS AFFECTING RADIATION REQUIREMENTS

All types of radiators do not produce equal heating effects per square foot of surface. Consequently, there are a number of factors that must be considered when determining the radiation (meaning square foot of radiating surface) which will be required for maintaining a given space at a desired temperature. The kind of radiating surface, how the radiator will be installed, whether direct, recessed, concealed or indirect, the work the radiator will be required to do and its location in the room are the principal factors that affect the area required. Each of these will be considered in detail in the next lesson.

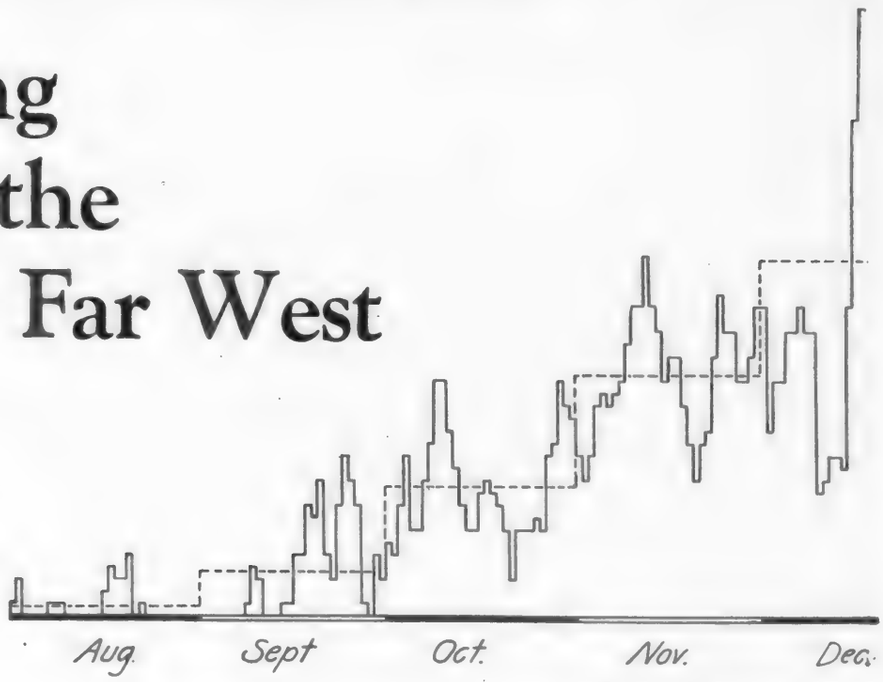
(To be continued)

Gas Heating in the Far West

From Data Furnished

By E. L. Hall

General Superintendent Portland Gas & Coke Company.



The 1924-5 Heating Load in

A Residence in Portland, Oregon, and Its Gas-Fired Warm-Air Heating Plant.

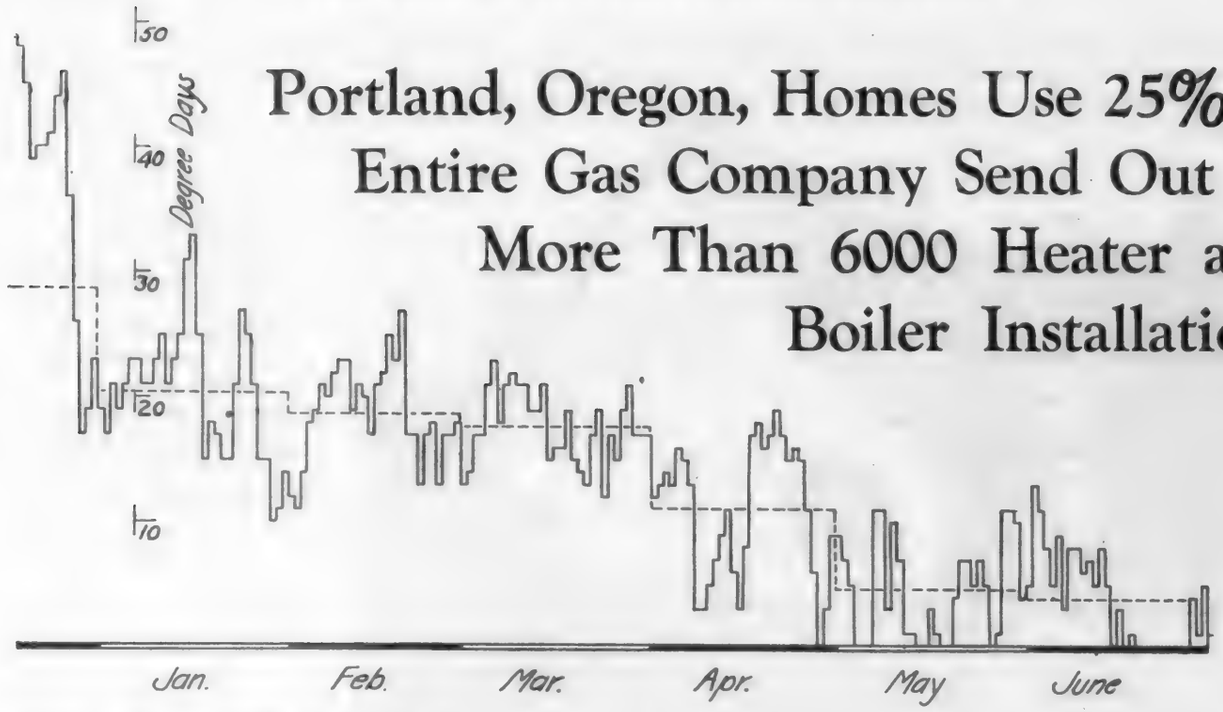
HOUSE heating with gas fuel in Portland, Oregon, has been fostered by climatic conditions that are admittedly ideal. The ability of the Portland Gas & Coke Company to market gas for house heating at an average of $0.60 per 1000 cu. ft., coupled with the climatic conditions, has resulted in the installation of over six thousand gas-fired boilers and furnaces in this city with a population of a quarter of a million.

Over a quarter of the entire send-out of gas is consumed in heating appliances, which would appear to be a maximum percentage in the United States.

UNIQUE WEATHER CONDITIONS

While, in many northern cities of the United States, the gas officials are worried over the problem of a summer load with which to offset what-

Portland, Oregon, Homes Use 25% of Entire Gas Company Send Out In More Than 6000 Heater and Boiler Installations

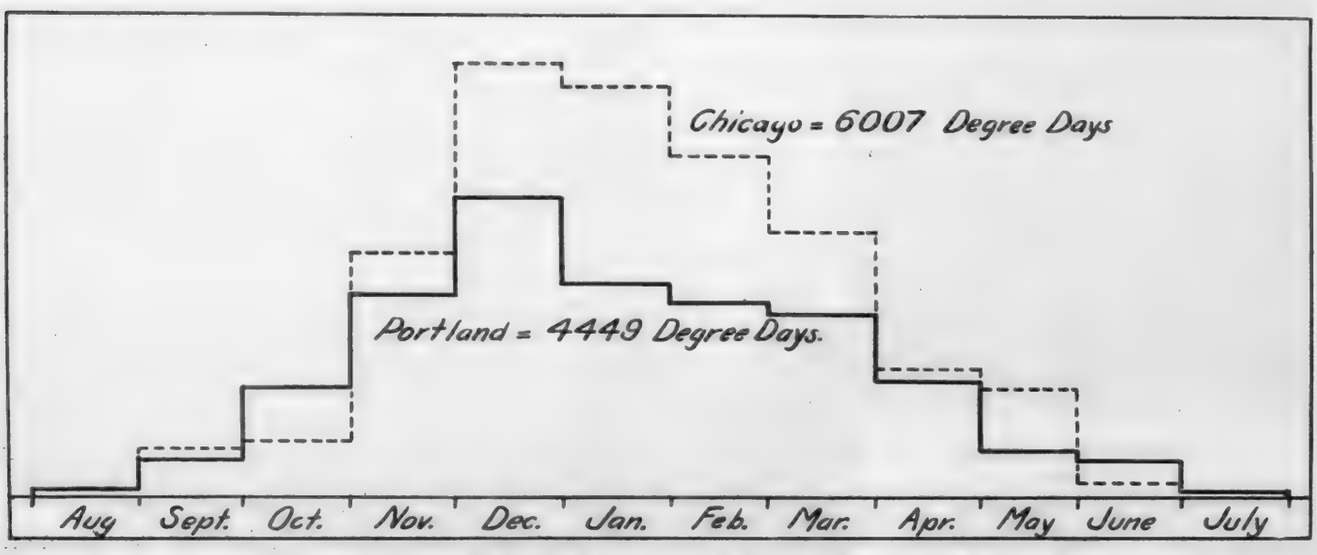


Portland, Oregon, Expressed in Degree Days

ever strictly winter load may be taken on for house heating, the Portland company goes blithely on its way, for the "heating season" is no respecter of seasons, and includes two of the three summer months. As a matter of fact, there is a slight theoretical demand for heat in the other summer month, but it is so small as to be negligible in practice.

To bring out as clearly as possible this unusual condition, the heating load for Portland for the heating season of 1924-25 has been developed in degree days. As an additional indication of the unusual characteristic of the Portland load, a plotting has been made of the average monthly demand for Portland, superimposed on the same demand for Chicago. Although the annual load in Chicago is 35% greater than in Portland, the smaller total is spread over twelve months, as against ten months in Chicago, or nearly 16% less time element. A study of these graphic data, in connection with the story of gas heating in Portland, indicates, if it does not make obvious, the reasons for developments that may not appear orthodox to the dweller in a milder climate.

In Portland, the consumption of gas for heating houses has grown steadily since 1916. During 1924 the gas consumed for heating was over 25% of the total consumption. The heat value of the gas served is 570 B.T.U. per cu. ft. The rate for heating averages about 60 cents per 1000 cu. ft. for an ordinary house, that is a house of about 10,000 cu. ft. volume. For heating smaller places the rate is slightly higher, due to a higher rate for the first 6000 cu. ft. of gas consumed per month.



Comparison of Portland, Oregon, and Chicago Heating Loads

The Installation in This Attractive Portland Residence Indicates the Attention to Detail That Characterizes the Work of the Portland Gas & Coke Company. The Result is Low Annual Heating Cost.

COST OF HEATING WITH GAS

Houses are heated by gas as cheaply as they were formerly heated by solid fuel. This is not alone due to the higher efficiency of gas heating appliances over solid fuel heaters, but it is also because defects in the distribution ducts and mains were corrected before the gas heating appliances were connected. Warm air heating systems are installed with one or more return ducts instead of a cold air inlet, in the interest of economy and for obtaining better distribution of warm air.

The normal heating season in Portland has a load of 4449 degree days. For heating a house of 10,000 cu. ft. for a season the consumption of gas runs around 200,000 cu. ft., costing, at 60c per 1000 cu. ft., approximately $120.00.

For comparison, the prices at Portland for solid fuel are given as follows:

(Prices delivered, sawed and put in basement)

	Per cord
Wood—Fir	$10.50
Oak	13.50
Ash	11.50
Slab	8.00
	Per ton
Coal—Rock Springs	$15.00
Utah	15.00
Washington	15.00
Carbon briquets	16.50

(15,800 B.T.U. per pound).

The competition of oil has not been felt. Although it is possible that the cost of the oil fuel may be less than that of gas it is probable that the cost of maintenance on the oil burner will be a material factor, as will also be the cost of electric current for the burner. Noise is one of the drawbacks of the oil burner; also the possibility of failure in the electric service causing a discontinuance of heating.

HEATING LOAD FACTORS

The ratio of degree days in the coldest month to that of the heating season is between 1:5 and 1:6. The ratio of gas required for heating in the coldest month to that required for the heating season is, of course, within these limits. In other words, the gas required for a season's heating is five or six times more than the gas required in the coldest month. The same ratio holds for the cost.

The yearly, monthly, or daily gas requirement for heating is proportional to the degree days for

the time involved. However the *hourly gas requirement* is not proportional to the *hourly temperature deficiency*, the maximum gas demand hour always being in the morning when houses are being warmed up for the day. In cold weather the consumption during the maximum-demand hour for the average installation is 1/16 of the total gas requirement for the day, while for the diversified heating load the maximum hour is 1/19 of the total for the day.

Wind has the effect of increasing the gas consumption for heating, the conventional recognition being on the basis of one mile per hour increase in average wind velocity, above seven miles per hour, having an effect the same as one degree drop in temperature.

Gas heating plants installed by the Portland Gas & Coke Company are designed for a minimum temperature of 10° F.

DEVELOPMENT

The heating business of the Portland Gas & Coke Company has been in the course of development since 1908. At that time the company established rates for heating at 50c per 1000 cu. ft. (furnished through a separate meter) as compared with the then prevailing ordinary residential rate of $1.00 per 1000 cu. ft.

Due to the lack of appliances suitable for economical heating, little progress was made until 1911, when impetus was given by the invention of the Rector system of gas heating, which was extensively put out by this company.

The Rector system consisted of radiators placed in the rooms, combustion taking place in the radiators and the products of combustion being exhausted through piping, by means of a vacuum fan. The Rector system was very economical in gas consumption because there were no transmission losses, the exhaust loss was slight, and it was practical to use only one or a few radiators of a system. The question of proper draft was eliminated with the Rector system because it was produced artificially with an electric fan. However, the mechanical complication required a great deal of care by the owners, and made necessary considerable service by the gas company. Also, the radiators were gradually disintegrated by the heat and the chemical action of the products of combustion. Installation of Rector systems was therefore discontinued.

PORTLAND GAS AND COKE COMPANY BUILDS FURNACES AND HEATERS

Since then a number of other appliances have been sold by this company, most of which have, through necessity, been devised by the engineers of the company. Noteworthy are the Gasco furnaces, and the Gasco floor heater. The standard Gasco furnace is constructed with a sheet-metal combustion chamber and secondary radiation of cast-iron Vento sections. This arrangement of sheet metal and cast-iron heating surfaces gives the unique combination of quick heating by the furnace and slow cooling off. The hot products of combustion in contact with the sheet-metal burner chamber do

Note, at Left, the Large Return Duct With Inspection Door.

An Excellent Example of High-Class Installation In Small Home.

not have a deteriorating effect upon it, while the corrosive action of the cooled products and resulting condensation is resisted by the heavy cast-iron Vento radiation.

The standard Gasco furnace is made in units of two sizes, one with a capacity of 60,000 B.T.U. per hour and another with a capacity of 90,000 B.T.U.

Portland Church Heated With Warm Air

per hour. These units are multiplied to give a furnace of any capacity desired. Below is shown a battery of Gasco furnaces installed in the church illustrated herewith before the casing was put on and vents connected. The furnace in the background is a temporary installation.

The products of combustion pass from the burner box down through the interior of the Vento sections and then through the cast-iron exhaust manifold to the vent. The C. I. Gasco furnace shows an efficiency of about 90%.

In order to meet the demand for a cheaper furnace the sheet-steel Gasco furnace was developed. All of the heating surface on this furnace is of sheet-metal. The exhaust connection at the bottom of the furnace is made of copper, to resist the action of condensation. This furnace is designed for a lower efficiency than the standard furnace, in order to avoid the forming of condensation on the heating surface, and the resulting rapid deterioration. The sheet-steel Gasco furnaces are made in units corresponding in capacity to those of the cast-iron Gasco furnaces.

A floor heater, having greater capacity than the ordinary gas floor heater, was also put out by the company. This floor heater has a capacity of 22,500 B.T.U. per hour. The great number of these heaters installed during the last two or three years for heating small houses or aiding other heating apparatus has proved the wisdom of this move. Several types of gas-fired boilers have been installed by the company, to meet the desires of customers. There are now over 13,000 gas heating appliances installed in Portland classified as follows:

Furnaces, Gasco	3,235
Furnaces, other makes	2,361
Boilers	337
Radiators	1,143
Space Heaters	6,314
Miscellaneous	33
	13,423

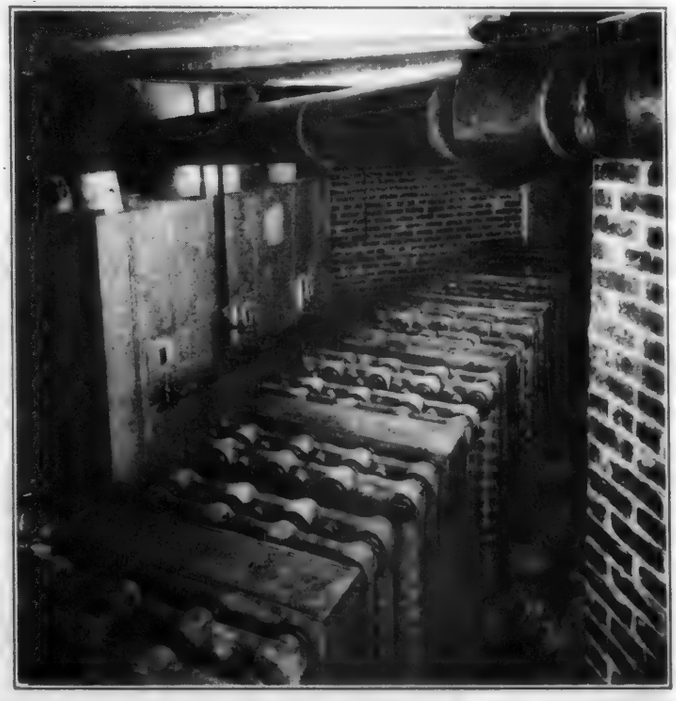
INSTALLATION POLICY

It has been the policy of the Portland Gas & Coke Company to install all heating systems in accordance with the most advanced practice. The work of the University of Illinois on warm-air heating has been studied, and its data used in design. The handbook of the American Society of Heating and Ventilating Engineers has been the guide for water and steam heating. The information appearing in the trade magazines has been used to advantage. As a result gas heating installations in Portland are of a higher standard of design and construction than are solid fuel installations in residences. This practice, as stated before, has not a little to do with the economy of gas heating. The gas company also has done considerable research work along various lines of the general problem.

At present the company is encouring the installation of weather-strip, and the insulation of buildings in the interest of economical heating. A pamphlet on this subject is being prepared for free distribution to architects, builders and house owners.

All heating appliances are required to be vented. As a result the so-called "unvented fumeless radiators" have not been installed in very great num-

(*Continued on Page* 69)



Warm Air Furnace for Church, During Erection

A New Humidity Chart

Effective Use of the Nomographic Method of Presentation in Simplifying Air Conditioning Calculations

By V. A. Nekrassoff

Research Engineer for Proctor & Schwartz, Inc., Philadelphia, Pa.

Mr. Nekrassoff is a graduate of the High Artillery School and of the Michael Artillery Academy of Petrograd, Russia. He served for some time as chief of the mechanical laboratory of Petrograd Armory. He was later assigned to the permanent staff of the Michael Artillery Academy as a lecturer on higher mathematics, mechanics and ordnance engineering. During the late war he acted as chief of the Russian Technical Bureau in New York for the manufacture and inspection of ammunition for the Russian Field Artillery, being appointed later as Colonel of the Guards Artillery. Mr. Nekrassoff summarizes his later career as follows: Homeless Russian refugee in Canada (1918); workman in pits and afterwards a research engineer with the Black Lake Asbestos Company, Black Lake, Que., Canada (1919-1920). At present research engineer with Proctor & Schwartz, Inc., Philadelphia. Awarded the Lumby Premium (1924) by the Institution of Heating and Ventilating Engineers of England for his Paper on Heat Insulation Tests.

An immediate aim of the present article is to show once more the superiority of the nomographic charts (nomograms) in comparison with common diagrams, which almost invariably take the form of the locus representing a given equation referred to rectangular co-ordinates (Cartesian co-ordinates). In order to make these diagrams applicable on the required range of the variables involved in the equation, it is necessary to use several sets of curves or straight lines. This makes the diagram confusing and difficult to read and if any of the variables are affected by exponents, the disadvantages of this direct, purely geometric method of interpretation of our equation are greatly increased.

It is necessary only to take a glance at the nomographic type of humidity chart described in the present article and the humidity charts published by the U. S. Forest Service (Bulletin 104) or by Professor L. A. Harding or Willis H. Carrier, to realize the marked advantages of the nomographic chart.

Instead of a confusing net of curved and straight lines, we need to make use only of the three scales for solving any one of at least seven different problems as shown and explained on the chart. The only manipulation which is required in all cases is to apply the straight edge of a rule (or a fine, colored thread) to the two points taken on the two scales and read a third point on the third scale.

As to the practical accuracy of results it may be seen on the chart that the temperatures are read to 1° F., percentage of relative humidity to 1%, grains of moisture per cubic foot to ¼ or 1/10 of a grain, which is entirely within the "technical accuracy" required in ordinary heating or ventilating practice.

THE theoretical accuracy of the accompanying nomographic type of humidity chart is connected directly with the accuracy of that equation which is taken as a basis for its construction.

Professor Ferrel's formula:

$$P=P_{sw}-0.000367B\left(1-\frac{T_w-32}{1571}\right)(T_d-T_w)=P_{sw}-A_F(T_d-T_w) \quad \ldots(1)$$

and the rational psychrometric formula of W. H Carrier:

$$P=P_{sw}-\frac{(B-P_{sw})(T_d-T_w)}{2755-1.28T_w}=P_{sw}-A_C(T_d-T_d) \quad \ldots(2)$$

can be combined in one very simple formula which gives practically the same results as these formulæ and which is susceptible of being represented very simply by the collinear nomogram (alignment) chart.

This formula is:

$$P=P_{sw}-A(T_d-T_w) \quad \ldots(3)$$

In all these three formulæ the following notations are adopted:

1. P = actual aqueous vapor pressure at the temperatures. T_d (dry bulb) and T_w (wet bulb) in inches of mercury.
2. P_{sd} and P_{sw} = aqueous vapor pressures corresponding to the state of complete saturation of space at temperatures T_d and T_w (in inches of mercury).
3. B = atmospheric pressure (inches of mercury).

$$4.\begin{cases} A_F=0.000367B\left(1-\dfrac{T_w-32}{1571}\right) \\ A_C=\dfrac{(B-P_{sw})}{2755-1.28T_w} \end{cases}$$

Having calculated these variable coefficents A_f and A_c for various temperatures on the interval $T_w = 0°$ F. and $T_w = 120°$ F., we will find that A_f varies from 0.01120 down to 0.01013 and A_c varies from 0.01085 down to 0.01018. This result suggests the use of a constant coefficient A.

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If both of the coefficients mentioned above (A_f and A_c) are represented graphically as functions of the temperature T_w (on the interval 0° — 120° F.) then it becomes evident that they both can be considered as two straight lines almost parallel to the axis T_w, and taking a straight line which is parallel to axis T_w, and is located at 0.01087 upon this axis we will arrive at the conclusion that A = 0.01087 and is that constant coefficient which can be used, in place of the coefficients A_f and A_c.

Strictly speaking, A_f is a straight line with a very slight slope in respect to the T_w axis, and A_c is a certain curved line which, on the interval (0° — 120° F.), is almost flat.

The above formulæ (1), (2) and (3) can be used for computing the relative humidity (R) which, according to its physical definition, is

$$R = \frac{P}{P_{sd}} \quad \text{.....(4)}$$

The following Table 1 shows the results of calculations of R from (4), using the values of P taken from (1) and (2).

The same R's were calculated, also applying formulæ (3) with A = 0.01087.

Table 1

1	2	3	4	5	6	7
T_d	T_w	Prof. Ferrel's formula.	Mr. W. H. Carrier's formula.	Δ_1	A=0.01087	Δ_1
20°	16°	R = 39.57%	R = 40.35%	+0.78	R = 40.40%	+0.83
20°	18°	R = 69.30%	R = 69.69%	+0.39	R = 69.70%	+0.40
50°	35°	R = 10.83%	R = 10.56%	−0.27	R = 11.10%	+0.27
50°	42°	R = 49.70%	R = 49.40%	−0.30	R = 49.70%	±0
86°	72°	R = 68.24%	R = 68.05%	−0.19	R = 68.00%	−0.24
80°	50°	R = 3.33%	R = 2.98%	−0.35	R = 3.33%	±0
110°	65°	R = 5.12%	R = 4.73	−0.39	R = 4.93%	−0.19
110°	90°	R = 46.50%	R = 46.30%	−0.20	R = 46.20%	−0.30
140°	100°	R = 25.42%	R = 25.42%	±0	R = 25.30%	−0.12
140°	130°	R = 75.08%	R = 75.16%	+0.08	R = 75.00%	−0.08
			$\sum\Delta_1$ =	1.280	$\sum\Delta_1$ =	1.126

Since the equation (1) was derived by Professor Ferrel as the result of the many experimental measurements conducted by the U. S. Weather Bureau, we may take this equation as the base and from the columns 5 and 7 in Table I we conclude that the equation (3) with the constant coefficient A = 0.01087 gives us even better results than the formula derived by W. H. Carrier (on this particular interval of temperature 20° — 140° F. and for these wet-bulb depressions) chosen at random.

For that reason, in the present article, instead of (1) and (2), we will consider the following equation as our subject of the nomographic representation:

$$P = P_{sw} - 0.01087(T_d - T_w) \quad (5)$$

Then (4) can be rewritten:

$$R = \frac{P}{P_{sd}} = \frac{P_{sw} - 0.01087(T_d - T_w)}{P_{sd}} \quad \text{.....(6)}$$

If the pressures are measured in pounds per square inch then we have:

$$R = \frac{P_{sw} - 0.00534(T_d - T_w)}{P_{sd}} = \frac{P_{sw} + 0.00534\,T_w}{P_{sd}} - \frac{0.00534\,T_d}{P_{sd}} \quad \text{.....(6')}$$

This equation can be put in the following "reduced determinant form":

$$\begin{vmatrix} R & 1 & 1 \\ -\frac{0.00534\,T_d}{1+P_{sd}}, & \frac{P_{sd}}{1+P_{sd}} & 1 \\ -(P_{sw}+0.00534\,T_w), & 0, & 1 \end{vmatrix} = 0 \quad \text{.....(7)}$$

Comparing (7) with the determinant form of general equation, expressing the fact that three points $(X_1\ Y_1)$, $(X_2\ Y_2)$, $(X_3\ Y_3)$ are located on the straight line:

$$\begin{vmatrix} x_1, & y_1, & 1 \\ x_2, & y_2, & 1 \\ x_3, & y_3, & 1 \end{vmatrix} = 0 \quad \text{.....(8)}$$

We conclude that the Cartesian co-ordinates (X, Y) of the points located on loci along which we may graduate our scales for variables R, T_d and T_w will have the following forms (parametric forms), as it is shown in determinant form (7):

For R:

$x = R;\ y = 1$ *(a straight line scale)*

For T_d:

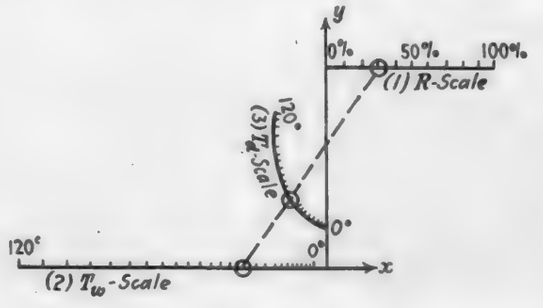
$x = \frac{-0.00534\,T_d}{1+P_{sd}};\ y = \frac{P_{sd}}{1+P_{sd}}$ *(a curved scale)*

For T_w:

$x = -(P_{sw} + 0.00534\,T_w);\ y = 0$ *(a straight line scale)*

Thus our scales, being constructed according to these equations, will have that peculiar property that every set of three points (R, T_d, T_w) satisfying the basic equation (6[1]) or (7) is located along the same straight line. In other words, by taking two of these variables, read on their scales and by joining these two points by a straight line (edge of a rule or a fine thread) we will find the third one on the point of intersection of our straight line with the third scale.

Having calculated X's and Y's for every scale for the temperatures T_d and T_w (by steps in 1° F.) and for R (by steps in 1%) we will have the following chart shown on Sketch 1.



Sketch 1

NOMOGRAPHIC TYPE OF HUMIDITY CHART.

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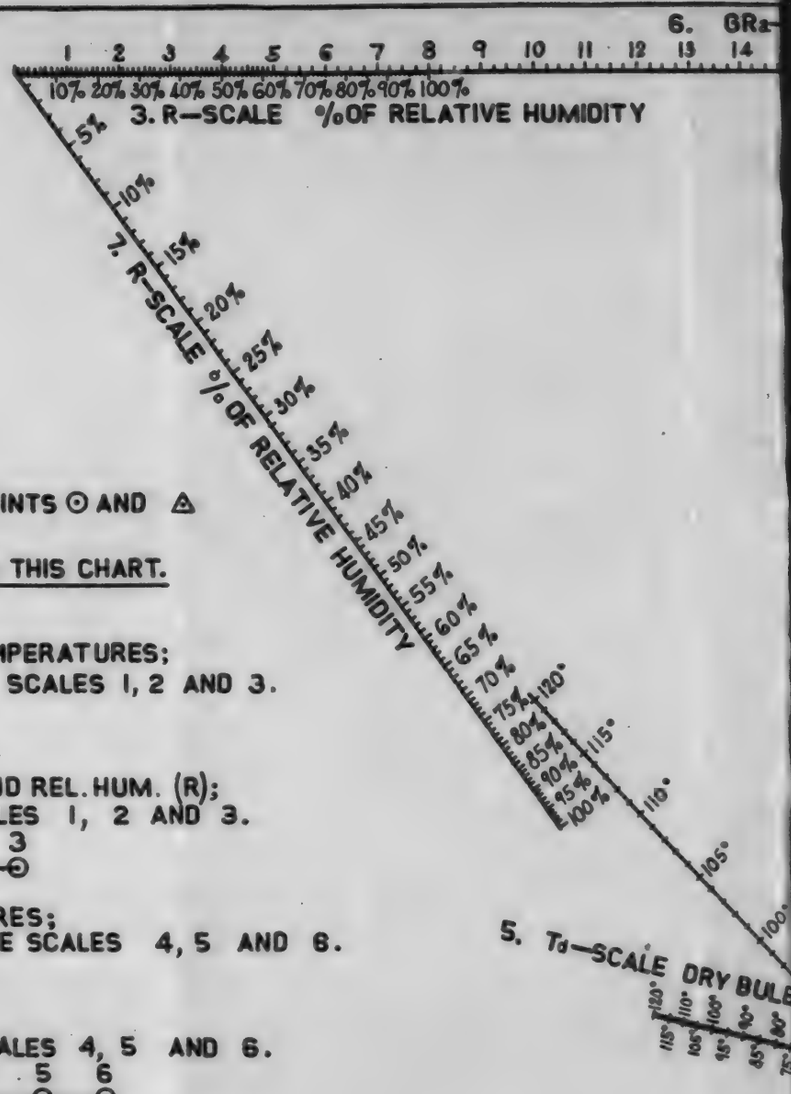
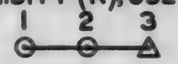


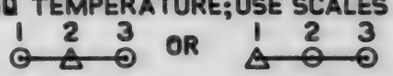
SYMBOLS: ⊙ POINT GIVEN; △ POINT SOUGHT,
——— A STRAIGHT LINE CONTAINING POINTS ⊙ AND △

THE FOLLOWING PROBLEMS CAN BE SOLVED ON THIS CHART.

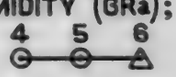
1. **GIVEN:** DRY (Td) AND WET (Tw) BULB TEMPERATURES;
TO FIND: % OF RELATIVE HUMIDITY (R); USE SCALES 1, 2 AND 3.



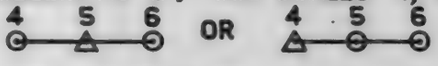
2. **GIVEN:** ONE OF THE ABOVE TEMPERATURES AND REL. HUM. (R);
TO FIND: SECOND TEMPERATURE; USE SCALES 1, 2 AND 3.



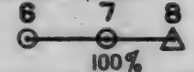
3. **GIVEN:** DRY AND WET BULB TEMPERATURES;
TO FIND: ABSOLUTE HUMIDITY (GRa); USE SCALES 4, 5 AND 6.



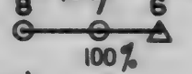
4. THE SAME TYPE PROBLEM AS 2; USE SCALES 4, 5 AND 6.



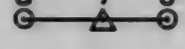
5. **GIVEN:** DRY AND WET BULB TEMPERATURES;
TO FIND: THE DEW POINT TEMPERATURE; SOLVE PROBLEM 3 AND AFTER GRa IS FOUND USE SCALES 6, 7 AND 8.



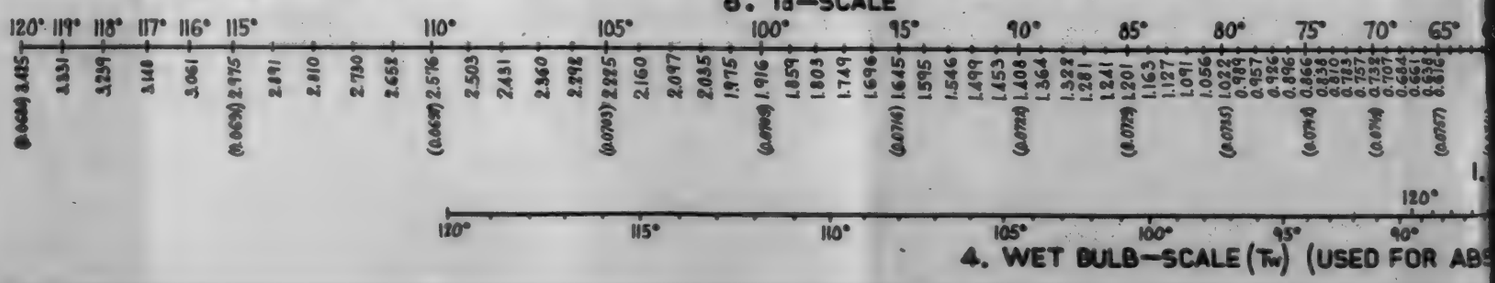
6. **TO FIND:** THE MOISTURE CONTENT CORRESPONDING TO COMPLETE SATURATION (100% REL. HUM.) AT GIVEN TEMPERATURE; USE SCALES 6, 7 AND 8.

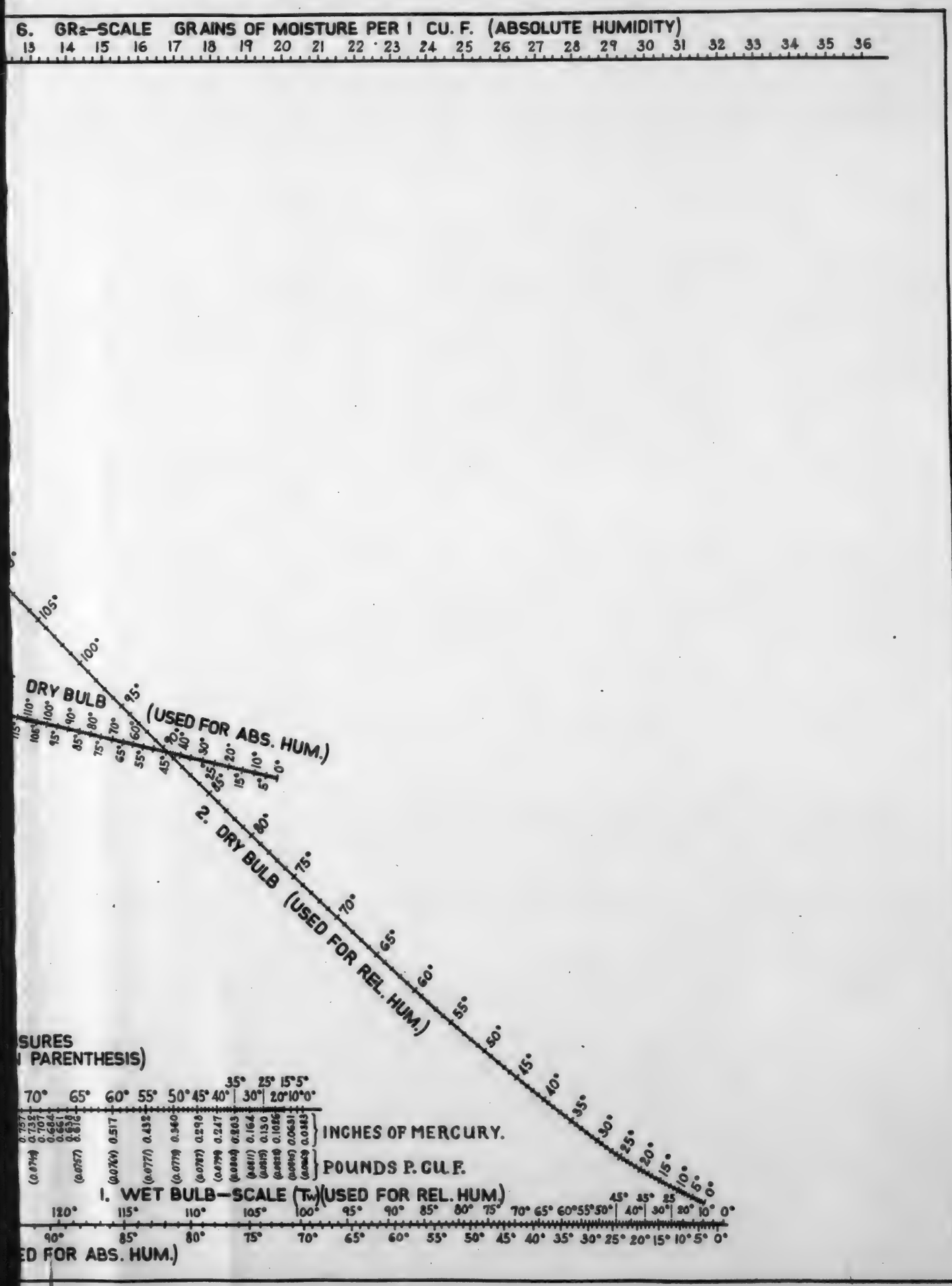


7. **GIVEN:** DRY BULB TEMPERATURE AND DESIRED MOISTURE CONTENT; (ABS. HUM.)
TO FIND: THE RELATIVE HUMIDITY; USE SCALES 6, 7 AND 8.



8. SCALE 8 IS A FUNCTIONAL SCALE GIVING BY THE IMMEDIATE READING THE AQUEOUS VAPOR PRESSURES (INCHES OF MERCURY) AND WEIGHT OF ONE CU. FT. OF DRY AIR IN POUNDS (FIGURES IN PARENTH




6. GRs—SCALE GRAINS OF MOISTURE PER 1 CU. F. (ABSOLUTE HUMIDITY)
13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
DRY BULB (USED FOR ABS. HUM.)
2. DRY BULB (USED FOR REL. HUM.)
SURES
PARENTHESIS)
INCHES OF MERCURY.
POUNDS P. CU. F.
1. WET BULB—SCALE (Tw) (USED FOR REL. HUM.)
ED FOR ABS. HUM.)

The absolute humidity (GR_a) corresponding to the relative humidity (number of grains of moisture per cubic foot) can be calculated from the formula—(pressure in pounds per square inch).

$$GR_a = \frac{11796\,P_{sd}\,R}{460+T_d} \quad \text{.....(9)}$$

Inserting in this equation R taken from (6^1) we will have:

$$GR_a = \frac{11796(P_{sw}+0.00534\,T_w)}{460+T_d} - \frac{62.951\,T_d}{460+T_d} \quad \text{.....(10)}$$

which is an equation completely analogous in its form to the equation (6^1).

Its "reduced determinant form" will be:

$$\begin{vmatrix} \frac{GR_a}{8}, & 1 & 1 \\ \frac{-7.869\,T_d}{1197.875+T_d}, & \frac{460+T_d}{1197.875+T_d}, & 1 \\ -2(P_{sw}+0.00534\,T_w), & 0, & 1 \end{vmatrix} = 0 \quad \text{.....(11)}$$

and the "parametric equation" of the scales:

For GR_a:

$x = \frac{GR_a}{8}$ $\quad y = 1$ (a straight line scale)

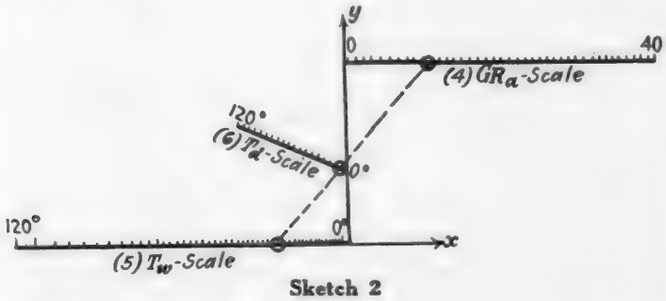
For T_d

$x = -\frac{7869\,T_d}{1197.875+T_d}$; $y = \frac{460+T_d}{1197.875+T_d}$ (a straight line scale)

For T_w:

$x = -2(P_{sw}+0.00534\,T_w)$; $y = 0$ (a straight line scale)

Having calculated X's and Y's for every scale for the temperatures T_d and T_w (1° F. step) and for GR_a, we will have the following chart shown on Sketch 2.



Sketch 2

The equation (9) can be also represented nomographically without inserting in it the relative humidity R from (6^1).

For this purpose we can write immediately its "reduced determinant form" as follows:

$$\begin{vmatrix} GR_a, & 0, & 1 \\ \frac{-11796\,P_{sd}}{460+T_d}, & 1, & 1 \\ 0, & \frac{R}{R+1} & 1 \end{vmatrix} = 0 \quad \text{.....(12)}$$

Hence the parametric equations of the scales will be:

For GR_a:

$x = GR_a$; $y = 0$ (a straight line scale)

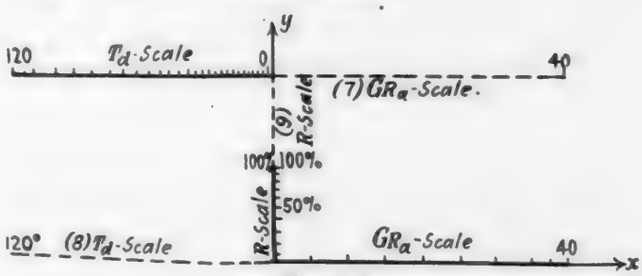
For T_d:

$x = \frac{-11796\,P_{sd}}{460+T_d}$ $\quad y = 1$ (a straight line scale)

For R:

$x = 0$; $y = \frac{R}{R+1}$ (a straight line scale)

Sketch 3 shows these scales.



Sketch 3

Of course, there is nothing to prevent us from turning this chart around the Scale T_d (on 180°) and thus directing the scales as shown by the dotted lines.

Now we can combine all the charts shown on Sketches 1, 2, and 3 together in one general chart and introduce at the same time several auxiliary changes, with a view of making our chart more handy and convenient in respect to its size, general appearance and simplicity of operation.

BRINGING THE CHART INTO FORM FOR CONVENIENT USE

Briefly stated, the following are final practical touches making our chart less clumsy and crude than it would have been in its elementary, theoretical form, as represented on Sketches 1, 2 and 3.

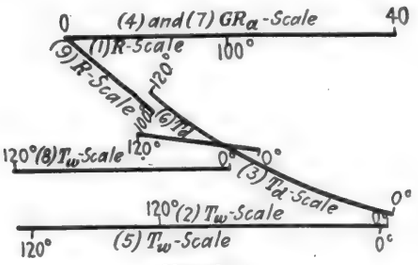
1. Having chosen a suitable moduli or factors converting the units of temperatures, pressures, grains and percentages into linear units (inches) in which the coordinates X's and Y's are measured along the vertical and horizontal axes, we will first draw all our scales together on the cross section paper (10 × 10 = 1 in.) in their initial mutual positions, as they are shown on Sketches 1, 2 and 3 (all the scales on these sketches are marked by the figures in parenthesis).

Thus the scales (1), (4) and (7) will be laid out on both sides of the upper horizontal axis: R-Scale and GR_a-Scale. Scales (2) and (5) on both sides of the lower horizontal axis: T_w-Scales. Scales (9) will be separate R-Scale and Scale (8) can be laid out somewhere over T_w-Scales as a separate T_w-scale.

2. Then the scales laid out on the horizontal axes (scales 1, 4, 7, 2, 5, and 8) can be shifted along these axes in opposite directions, thus making our chart as much shorter in horizontal direction as

we wish in order to preserve its suitable and handy size. By doing so we will change the right angle between the X-axis and Y-axis into another obtuse angle and therefore our vertical units along Y-axis will be changed (as the projections from the old vertical Y-axis on the new oblique Y-axis), but the horizontal units will stay the same.

Thus we will have the following nomographic type of humidity chart as shown on Sketch 4.



Sketch 4

All directions for the use of this chart for solutions of various (7) problems are shown on the chart itself.

Two additional functional scales are added along Scale 8 in order to include very useful data concerning the saturating aqueous pressures and weight of 1 cu. ft. of dry air in pounds at various temperatures.

ADVANTAGES IN PRACTICAL USE OF CHART

The practical use of this type of humidity chart, proves to have a very marked advantage in comparison with the ordinary charts constructed on the basis of a direct geometrical representation of given equations. As a general rule, in this type of nomographic chart, we have one graduated scale (on a straight or curved line) instead of the whole set of curves used in common diagrams—which is the result of the use of the parametric forms of the equations (three variables) for our scales but not of their common equations (two variables).

By introducing various factors in the rows and columns of the determinant forms of a given equation and by adding and subtracting these rows or columns we can produce an almost unlimited number of varieties of scales satisfying our basal equation, and use those scales which will be more suitable to our purposes in respect to sizes and forms of desired charts.

In conclusion, it would not be amiss to present an entirely different type of nomogram for the same equation (6′).

This equation can be rewritten as follows:

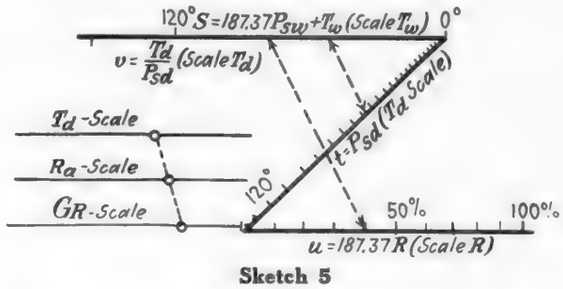
$$187.37R + \frac{T_d}{P_{sd}} = \frac{187.37P_{sw} + T_w}{P_{sd}} \quad \text{.....(13)}$$

or briefly:

$$u + v = \frac{s}{t} \quad \text{.....(13')}$$

In this form this equation is susceptible of being represented graphically on the so called Z-Chart.

Sketch 5 shows how the four different scales (u, v, s and t) are laid out along the three straight lines forming the contour of Z.



Sketch 5

This type of nomographic chart gives the solution of equation (13) in respect to any of the three variables (R, T_d and T_w) the two others being given.

Quite elementary geometrical considerations prove that u, v, s and t laid out on the scales, as it is shown on Sketch 5, will satisfy the equation (13′) if the straight lines joining v with u and s with t are parallel.

In other words, all the manipulations with this chart, are as follows:

1. Read T_w (on scale T_w representing s)
2. Read T_d (on scale T_d representing t)

} Join these points by a straight line (s—t)

3. Read T_d (on scale T_d representing v), and draw a straight line parallel to the straight line (s-t) and on its intersection with the Scale R (u) read a desired R.

This chart requires a special transparent celluloid sheet index on which a set of parallel lines is drawn. Then the above manipulations become very easy and simple. An additional alignment chart with the three scales (R, T_d and GR_a) will give the absolute humidity GR_a on the middle scale as soon as the two points R (found previously) and T_d are joined by a straight line. (See Sketch 5).

Of course the necessity of using a certain auxiliary implement for tracing the two parallel lines on the chart makes this chart apparently less simple than those in which only one straight line is required but, on the other hand, this chart has *only straight line scales* and is very simple in its process of construction as well as in its flexibility, making it adaptable to any desired range of variables.

All the details of construction and calculations of the described nomograms will be gladly furnished by the author.

In the present article a comparatively limited range of temperature (0° — 120° F.) was chosen under the assumption that these are the temperatures most often considered in heating or ventilating practice.

Another nomographic chart which will cover a far greater range of temperatures is now in the process of construction. Mathematically speaking, this new chart will represent the same equation (5), but the coefficient A is taken not as constant one (0.01087) but in its form A_c as it is determined in the formula derived by W. H. Carrier.

In other words, this new chart will be simply a nomographic interpretation of Mr. Carrier's rational psychrometric formula.

Gas Heating in the Far West

(*Continued from Page* 64)

bers. Vent connections to the chimney are of copper on all appliances that the gas company installs, in order to resist the corrosive effect of the products of combustion. However, some competitors install sheet-iron vents which usually soon distintegrate and have to be replaced.

The conversion of solid fuel boilers to burn gas has not been encouraged by the gas company, because of their low efficiency. However, a number of boilers have been converted at the insistance of the customers. The cost of fuel for the converted boilers averages 30% higher than for gas designed boilers.

VARIOUS TYPES OF HEATING EQUIPMENT INSTALLED

Steam and vapor systems are encouraged on account of their peculiar advantages over hot water systems, and the disappearance of certain disadvantages of steam and vapor when gas is used as fuel. Water and steam installations are usually installed with both water-temperature or steam-pressure, and room-temperature control. On hot water systems the Honeywell generator is recommended by the company in order to secure the advantage of small radiators.

It has been found desirable to line the chimneys connected to gas heating appliances with terra cotta flue lining in order to prevent condensation from seeping through the chimney and staining walls where they are not furred out.

Due to the high efficiency of gas heaters but little heat goes into the chimney, and only a slight draft is produced; therefore proper construction affecting draft has been carefully considered. Where a chimney is built on the outside of the house where it will be cooled, it has been found advantageous to build the chimney with insulating air spaces in order that the heat may be retained. If there are trees and higher buildings adjacent, a proper top should be installed to deflect down drafts.

The adherence to a high standard of installation is particularly important in a heating plant using gas fuel. The Portland Gas & Coke Company has proved this by its success in the heating field. A steady increase in this business is now going on without any money having been spent the last two years for advertising gas heating. Heating salesmen are provided with the necessary technical information and are assisted by the engineers of the company on all important prospects in order to insure a proper installation. After the order is secured the installation is made under the direct supervision of a heating engineer.

Welding Cast-Iron Pipe

Engineers who have had occasion to use cast-iron pipe welded with either cast-iron or bronze will be interested in the results of an investigation made by A. R. Lytle, of the Union Carbide and Carbon Research Laboratories, Inc., Long Island City, N. Y., reported at the recent convention of the International Acetylene Association. In his paper, "Effect of Heat of Bronze Welding on Cast-Iron Pipe," Mr. Lytle arrived at the following important conclusions:

1. Neither cast-iron welding nor bronze-welding has any detrimental effect on the structure of cast-iron pipe.

2. It is possible that with cast-iron very high in phosphorus, the bronze-welding may weaken the structure sufficiently to lead to failure, though this is doubtful.

3. Inasmuch as both welding with cast-iron or with bronze strengthen the base metal at that point, it is more or less natural that line failures in overstressed pipe should occur just outside these altered zones.

4. It may well be that some of the failures occuring in welded gas lines have been the result of surface cracks or defects in the pipe. The influence of these cracks may be emphasized by the welding process.

William L. Abbott Elected President of the American Society of Mechanical Engineers

As a result of the balloting by mail, which is the practice of the American Society of Mechanical Engineers in electing officers, the following men were chosen, following their designations by the Nominating Committee:

President: William L. Abbott, chief operating engineer, Commonwealth Edison Co., Chicago, Ill.; vice-presidents: A. G. Christie, professor of mechanical engineering, Johns-Hopkins University, Baltimore, Md., and William T. Magruder, professor of mechanical engineering, Ohio State University, Columbus, O.; managers: Roy V. Wright, managing editor of *Railway Age* and editor of *Railway Mechanical Engineer*, New York City; Robert L. Daugherty, professor of mechanical and hydraulic engineering, California Institute of Technology, Pasadena, Cal.; William Elmer, superintendent of middle division, Pennsylvania Railroad System, Altoona, Pa.; and Charles E. Gorton, chairman of American Uniform Boiler Law Society, New York; treasurer: Erik Oberg, editor-in-chief of *Machinery*, New York.

The following were elected delegates to the American Engineering Council: William L. Abbott, John T. Faig, Arthur M. Greene, Jr., John Lyle Harrington, Ira N. Hollis, S. H. Libby, Dexter S. Kimball, William B. Powell and Hugh L. Thompson.

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A. M. DANIELS, ... Contributing Editor

Executive and Editorial Offices . . 1123 Broadway, New York

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MODERN business journals, and this includes both engineering and trade magazines, do not need the admonition of the Associated Business Papers' Code of Ethics to deter them from publishing mere "puffs" of advertisers and their products. Most trade journals have long since passed that stage. But with the years has come a more subtle form of propaganda. In its essential features it purports to describe some new method or apparatus, or an improved adaptation of a known method, mentioning, in the proper place, the name and address of the manufacturer and leaving the impression that its like cannot be found elsewhere. Or it may be an inspired description of some installation of real, general interest, but spoiled by the emphasis placed upon the particular appliance which it is sought to bring into the limelight.

The alert reader, as we have often stated, is quick to distinguish propaganda when he sees it and then not only is the object sought through its publication defeated, but a dangerous antipathy is created which may endure.

In the light of this situation, what position is to be taken by the business paper which is trying conscientiously to keep its readers abreast of the technical developments in its field and at the same time inform them of what there is that is new on the market? The answer is obvious. Tell them. If benefits accrue to those whose products are mentioned, this must be considered a by-product of the main object sought.

A simple rule and one which THE HEATING AND VENTILATING MAGAZINE has adhered to, may be expressed in the statement that the reader's interest is always paramount. This means that the material to be found in a given issue, whether appearing in the so-called "editorial" section, or under "New Appliances," or elsewhere, may be regarded with confidence as printed solely with the view that it is something our readers would want to know. Just now more than the usual number of new ways of doing things are being introduced in the heating field and it will be our purpose in the future, as it has been in the past, to give our readers all the necessary information regarding them that their importance warrants.

CATALOGUE standardization appears to have reached the point of definite accomplishment, judging from the progress made by the National Trade Extension Bureau in its catalogue standardization program. The Bureau has long been at work on this subject and, more recently, has seen its favored size of 7¾ in. by 10⅝ in. adopted as standard by such important bodies as the National Association of Brass Manufacturers, the Eastern and Western Supply Associations and the National Association of Master Plumbers. In addition, the Structural Service Bureau of the American Institute of Architects has broadened its page size recommendation to include the 7¾ in. by 10⅝ in. size. It should be borne in mind that the size of the loose-leaf catalogue is determined by the size of the bound catalogue. A loose-leaf size of 8½ in. by 10⅝ in. is the same as a bound size of 7¾ in. by 10⅝ in.

There is much to be said in favor of the particular size chosen, and its widespread endorsement should make it easy now to settle on this size as standard for the heating and plumbing fields.

Remember the figures: 7¾ in. by 10⅝ in. for bound catalogues and 8½ in. by 10⅝ in. for loose-leaf, or salesmen's catalogues.

WHETHER the American Society of Heating and Ventilating Engineers is to have a "tempest in a teapot" or a real "hoss race" on its hands will be determined by the reaction of the society's eastern members to the proposals of the western chapters for fuller representation in the councils of the society. It is an old rule, but a pretty good one, that the best way to meet the demands of objectors is to place them in power and, in this case, have them instill some of their "Western" spirit into the ranks of the effete East.

WE inaugurate in this issue the twentieth year of publication of the monthly weather records, during the heating season, of New York, Boston, Pittsburgh, Chicago and St. Louis.

Oil-Fired Cast-Iron and Steel Boilers Show High Combined Efficiency

Results of Three Series of Tests, One with an A.B.C. Burner, One with a Winslow Industrial Type Burner and the Third with a Johnson Burner

TWO series of oil burner tests, one series with the burner installed in cast-iron boilers and the other with the burners attached to a steel boiler, are reported by the Automatic Burner Corporation and the Kewanee Boiler Company, respectively. With the cast-iron boiler the burner used was the A.B.C. With the steel boiler one test was made with a Winslow industrial oil burner and another with a Johnson oil burner.

The A.B.C. burner tests were conducted by Ara Marcus Daniels, consulting engineer, of Washington, D. C., to determine:

1. General operating characteristics when installed in a round coal-burning water boiler.
2. Overall plant efficiency and available heat supplied to the heating system for different rates of fuel combustion.
3. Effect of length of flue gas travel on over-all efficiency.
4. A comparison of burner operation with oils of different gravities.
5. Heat distribution at different rates of fuel consumption.

This burner is manufactured by the Automatic Burner Corporation, Chicago, Ill.

THE A.B.C. BURNER TESTS

All A.B.C. burner tests were conducted in uninsulated American Radiator Company Arco boilers of 25-in. diameter. One series was run in a 4-section boiler and another in a 6-section boiler. The test plant was designed and installed to simulate a residential two-pipe upfeed water heating system.

Means were provided for measuring temperatures throughout the test plant to permit a full determination of heat distribution and losses. Fuel consumption was measured by means of calibrated fuel tanks. Temperatures were measured by means of thermo-couples immersed or installed at required points or places and readings were taken with a potentiometer. All circulated water used for dissipating generated heat was measured in calibrated weighing tanks. Differential draft gauges were used for recording the draft at the base of the smoke flue and in the combustion chamber.

The duration of each test was one hour with running start and running stop. The plant was operated previous to beginning a test for a sufficiently long period to permit operating characteristics to have become steady. A sample of the flue gas was taken and analyzed at the beginning, end and twice during each test.

Three general series of tests were conducted:

1. Operation with flue gases showing a CO_2 content of as near 10% as draft regulation would permit.
2. Operation under maximum draft obtainable at base of smoke flue.
3. Operation under a draft as low as permissible.

While all the tests conducted afford valuable data, only the series during which the burner and plant were operated to secure a flue gas having 10% CO_2 content are analyzed in the report since the conditions obtaining in these tests are believed most closely to represent those attending burners as installed and operated in private residences.

The fuels used by the A.B.C. burner were those generally available throughout the country commonly known as fuel-oil and furnace-oil. The fuel-oil was 33.93° A.P.I., with a gross B.T.U. per pound of 19,235.5 and a gross B.T.U. per gallon of 136,907. The furnace-oil ran 37.60 A.P.I. with a gross B.T.U. per pound of 19,935 and a gross B.T.U. per gallon of 138,723.

The Challenge to Modern Heating and Ventilation

HERE is the full text of the momentous resolution adopted by the American Public Health Association at its recent annual meeting in St. Louis, Mo.:

WHEREAS hundreds of thousands of dollars are wasted every year on this continent in the installation and operation of systems of school ventilation which are not only not beneficial but are positively harmful to the health of school children, and

WHEREAS, in the light of current knowledge, the supply of as large an air volume in school rooms as 30 cu. ft. per minute, per capita, is necessarily accompanied with dangerous overheating of the school room in order to avoid resulting drafts, and

WHEREAS the use of ozone and other chemicals for treating schoolroom air has little or no scientific justification and little or no practical value:

RESOLVED, That the system of ventilating schoolrooms by fresh untreated outdoor air, admitted at the windows with gravity exhaust ducts for removing vitiated air from near the ceiling, is the most generally satisfactory method of school ventilation; and

RESOLVED: That state laws and city regulations interfering with such scientific and economical methods of school ventilation should be repealed in the interest of the public health.

PERFORMANCE CURVES

Fig. 1 shows three curves developed from the data secured during the tests in which the CO_2 content of the flue gas varied from 9.4 to 10.9%. The basis for studying these data is "fuel burned—gallons per hour." Consequently the combustion rate has been used as abscissae for each of the curves shown with thermal efficiency of the plant (overall), flue gas temperature and heating effect in B.T.U. per hour as ordinates for respective curves.

It should be observed when studying these curves that with this boiler rated by the manufacturer at 1375 sq. ft. of direct water radiation, its equivalent in heat units per hour may be expressed as approximately 1375 × 150 = 206,250 B.T.U. per hour. By the heating effect curve (see dotted line), for this boiler to develop the equivalent of its 100% rating, it would be necessary to consume fuel at the rate of 2.2 gal. per hour. Under this condition the resulting overall plant efficiency obtained was 68%, a relatively high value for the conditions noted.

Since best overall plant efficiences with this type boiler may generally be expected at approximately 60% of boiler rating, it should be noted from this curve sheet that when developing a heating effect of 124,000 B.T.U. per hour (60% of 206,250 = 123,750 B.T.U.) an overall plant efficiency of 74% was obtained. Furthermore, the flatness of the efficiency curve indicates that relatively high overall efficiencies were obtained up to above 92% of boiler rating, for at a developed heating effect of 190,000 B.T.U. per hour, with fuel being consumed at the rate of 2 gal. per hour, the overall plant efficiency is shown to be 70%.

Furthermore, when it is remembered that the tests were conducted in an uninsulated boiler, the performance must be considered as excellent.

In order to facilitate comparisons at given rates of fuel consumption and to present results for review in a concrete manner, Table 1 has been prepared from the performance curves. Values for combustion rates above 2.4 gal. per hour have been omitted from Table 1 since at higher rates the boiler must be operated in excess 100% of its rating and this represents a condition that should be avoided in the installation of the burner.

In the last two columns of Table 1, the heating effect produced, in B.T.U. per hour, is expressed in terms of square feet of heating surface for steam and water direct radiation. These values may be used to approximate the total oil consumption required for given conditions.

Definitions

COMBUSTION RATE. *Quantity of fuel burned, expressed in pounds per hour or gallons per hour.*

HEATING EFFECT. *B.T.U. per hour added to the boiler water that would be available for circulation to and from the radiators of a water heating system. To express this in square feet of direct water radiating surface, the value of the heating effect may be divided by 150 (B.T.U. per hour per square foot of radiation) or for steam radiators by 240 (B.T.U. per square foot of radiation).*

THERMAL EFFICIENCY (OVERALL). *Heating Effect, divided by the total heat value of the fuel consumed. This represents the proportionate quantity of total heat in the fuel that is available for heating the house.*

COMBUSTION EFFICIENCY. *The percentage of CO_2 determined by analysis during a test, divided by the percentage of CO_2 that could be obtained by complete combustion of a given quantity of fuel with no excess air present.*

FLUE-GAS TEMPERATURE. *Average temperature of the flue gases taken at the base of the smoke flue.*

HEAT BALANCE

Heat balance data for each of the six tests from which the performance curve chart (Fig. 1) was developed, are contained in Table 2. These data are presented on the basis of heat units per pound of fuel as fired and on a per cent basis using the heat value of the fuel per pound as 100%.

A greater quantity of heat in the fuel was absorbed by the test plant during Test B than during any of the other tests, hence the highest efficiency was obtained during this test, namely 74.3%. This is considered exceptionally good for an uninsulated boiler. No CO was found in any samples of flue gas, hence the item for loss due to incomplete combustion is recorded as zero.

The loss due to radiation, convection and unaccounted-for losses should not properly be charged as a total loss since at least a part of this heat in an actual installation would be emitted so that it becomes useful in heating the house.

Therefore it seems reasonable to assume one-half of such recorded loss as available for heating the home.

On the basis of this allowance, the per cent heat in the fuel absorbed by the plant may be increased by one-half of that represented by these losses. Thus according to Test B, 14,297 + 444 + ½ (1,558) = 15,520 B.T.U. per hour or, dividing 15,298 by the heat value of the fuel, 19,236, the total heat from the fuel consumed that is available for heating the home becomes 80.7% of that in the fuel burned.

FUEL-OIL GAVE HIGHER OVERALL PLANT EFFICIENCY IN A.B.C. BURNER TESTS

A comparison of two series of tests with oils of different gravities indicated that a higher overall plant efficiency was obtained with fuel-oil than with the furnace-oil within the range of desirable combustion rates. Comparing the overall efficiency, heating effect and flue-gas temperature obtained when operating on fuel-oil with similar quantities when operating on furnace-oil at the same rate of combustion by weight (10 lbs. per hour), for the best test operating condition, the operations of the plant with fuel-oil was better than when the lighter furnace-oil was used.

Table 3 shows that an overall efficiency of 73% was obtained with the heavier oil as against an overall efficiency of 62.3% with the lighter furnace oil. The heating effect was 140,000 B.T.U. per hour as compared with 124,000 B.T.U. per hour in favor of the heavier oil.

TABLE 1—HEATING EFFECTS SECURED WITH A.B.C. BURNER AT VARYING COMBUSTION RATES.

Combustion Rate Gal. Per Hour	Thermal Efficiency Per Cent	Flue Temperature F°	Heating Effect		
			B. t. u. Per Hour	Sq. Ft. Radiation	
				Steam at 240 B. t. u. Per Sq. Ft.	Water at 150 B. t. u. Per Sq. Ft.
1	75	323	92,000	383	613
1.2	74	353	118,000	492	787
1.4	73	390	140,000	583	933
1.6	72	428	159,000	663	1060
1.8	71	470	175,000	729	1165
2	69	508	189,000	788	1260
2.2	68	540	203,000	846	1350
2.4	66	568	216,000	900	1440

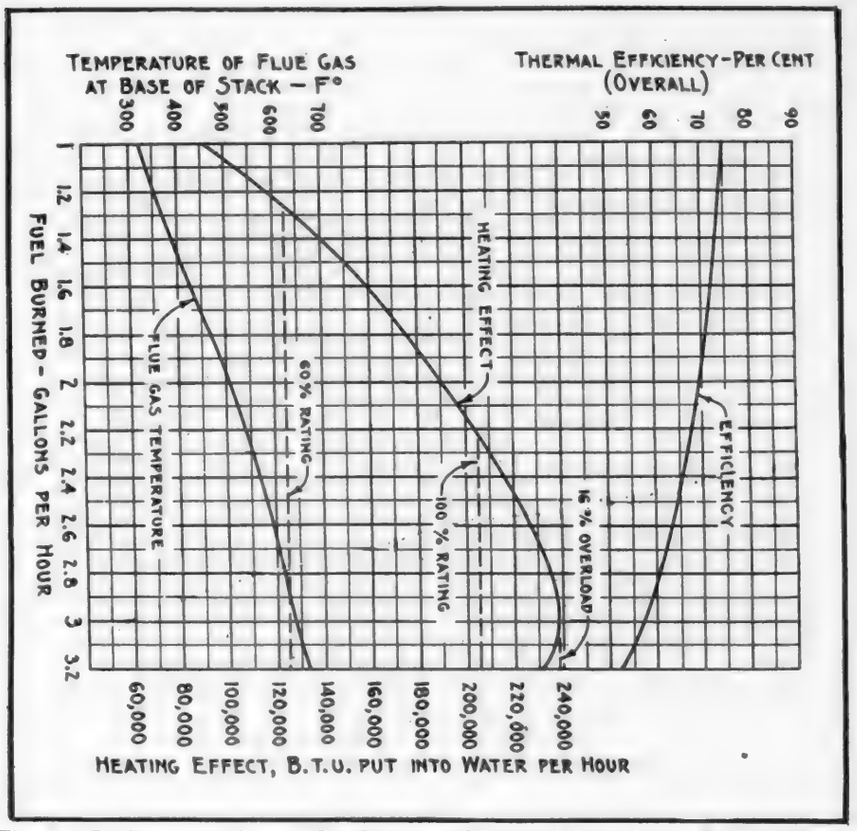

TEMPERATURE OF FLUE GAS AT BASE OF STACK – F°
300 400 500 600 700
THERMAL EFFICIENCY – PER CENT (OVERALL)
50 60 70 80 90
FUEL BURNED – GALLONS PER HOUR
1 1.2 1.4 1.6 1.8 2 2.2 2.4 2.6 2.8 3 3.2
HEATING EFFECT
FLUE GAS TEMPERATURE
60% RATING
100 % RATING
16 % OVERLOAD
EFFICIENCY
60,000 80,000 100,000 120,000 140,000 160,000 180,000 200,000 220,000 240,000
HEATING EFFECT, B.T.U. PUT INTO WATER PER HOUR

Fig. 1. Performance Curve, Conditions and Derived Data for A.B.C. Oil Burner Test B

Date	3-24-25
Duration of Test—Hours	1
Heater Used, Arco	6-25-W
Fuel Oil, Gravity	33.93 B°
RATES	
Fuel Burned, Pounds per Hour	8.76
Fuel Burned, Gallons per Hour	1.231
DRAFT	
Base of Flue, Ins. of Water	+0.019
Combustion Chamber, Ins. of Water	0.000
Ash Pit, Ins. of Water	
TEMPERATURES, FAHRENHEIT	
Fuel	69°
Surface Smoke Pipe	197°
Flue Gas	359°
Air to Ash Pit	67°
FLUE GAS ANALYSIS	
Carbon Dioxide, per cent by volume	9.4
Oxygen, per cent by volume	8.0
Carbon Monoxide, per cent by volume	0.0
Nitrogen, per cent by volume (difference)	82.6
HEAT BALANCE PER POUND OF FUEL AS FIRED	
a. Heat Imparted to Tank Water, B. t. u.	14,297
b. Heat Lost Due to Moisture Content of Fuel, B. t. u.	0
c. Heat Lost Due to Water Vapor Formed in Burning Hydrogen, B. t. u.	1370
d. Heat Lost Due to Moisture in Air Used for Combustion, B. t. u.	22
e. Heat Carried Away by Dry Chimney Gases, B. t. u.	1545
f. Heat Lost by Radiation from Heater and Smoke Pipe, B. t. u.	444
g. Heat Lost Due to Unconsumed Gaseous Combustible Matter, B. t. u.	0
h. Heat Lost Due to Unconsumed Combustible Soot, B. t. u.; Heat Lost Due to Convection and Unaccounted Losses, B. t. u.	1558
i. Total Heat Value of Fuel as Fired, B.t.u., per pound	19,236
HEAT BALANCE, PER CENT HEAT IN FUEL AS FIRED	
a. Heat Imparted to Tank Water (thermal efficiency), per cent	74.3
b. Heat Lost Due to Moisture Content of Fuel, per cent	0.0
c. Heat Lost Due to Water Vapor Formed in Burning Hydrogen, per cent	7.1
d. Heat Lost Due to Moisture in Air Used for Combustion, per cent	0.1
e. Heat Carried Away by Dry Chimney Gases, per cent	8.0
f. Heat Lost by Radiation from Heater and Smoke Pipe, per cent	2.3
g. Heat Lost Due to Unconsumed Gaseous Combustible Matter, per cent	0.0
h. Heat Lost Due to Convection and Unaccounted Losses, per cent; Heat Lost Due to Unconsumed Combustible in Soot, per cent	8.2
Total Heat Value of Fuel as Fired, per pound	100.0
Total Per Cent Delivered as Useful Heat (a + f + ½h)	80.7
ELECTRIC POWER, D.C.	
Volts	112.1
Amperes	0.3
Watts	33.6

EFFECT OF LENGTH OF FLUE TRAVEL

The advantage of increased gas travel is clearly demonstrated by a comparison of the results of similar tests conducted first in a 6-section boiler and repeated in a 4-section boiler. High flue-gas temperatures result in high chimney losses.

Two comparisons of operation when burning fuel-oil at rates of 1.405 and 1.907 gal. per hour, respectively, are made in Table 4.

At the lower rate of fuel consumption (1.405 gal.) the flue gases, after passing the heat-absorbing surfaces of the 4-section boiler, showed a temperature of 545° F. Under the same operating conditions in the 6-section boiler, the flue-gas temperature was recorded at 380° F., showing a reduction of 165° F., which is equivalent to a reduction in flue-gas temperature of 30% in favor of the increased travel.

The overall plant efficiency increased from 61% in the 4-section boiler to 73% in the 6-section boiler, which indicated that the increased gas travel in the 6-section boiler, with consequent reduction in the flue-gas temperature, resulted in a saving of 16.7% of the heat which would have been lost during similar operation in a 4-section boiler at a fuel consumption rate of 1.405 gal. per hour.

TABLE 3. COMPARISON OF OPERATION WITH FUEL-OIL (33.93° A.P.I.) AND FURNACE-OIL (39.49° A.P.I.)

Basis: 10 lbs. per hour, equivalent to 1.405 gal. fuel-oil and 1.437 gal. furnace-oil

Fuel-oil	Efficiency, per cent	Heating Effect, B.T.U.	Flue Gas Temp. deg. F.
Fuel-oil	73	140,000	363
Furnace-oil	62.3	124,000	380

Operating conditions, 10% CO in flue gas. Six-section heater.

Table 4 contains also a comparison at the higher combustion rate of 1.970 gal. per hour. At this rate of fuel consumption, the smaller boiler was operating at a relatively lower boiler efficiency than the larger boiler, since it was developing nearer its rated capacity. Hence the flue-gas temperature was considerably higher, averaging 710° F. during the test, whereas in the 6-section boiler, the average temperature was 510° F. The heat saved under these conditions, due to the increased flue-gas travel, was equivalent to a 30% saving.

All tests covered in this report were conducted with the same size refractory

TABLE 2—HEAT BALANCE

Test	B. t. u. Per Lb. of Fuel as Fired						Per Cent Heat in Fuel as Fired t					
	A	B	C	D	E	F	A	B	C	D	E	F
Heat absorbed by test plant (thermal efficiency)	13,345	14,297	13,875	13,166	11,728	10,470	69.4	74.3	72.1	68.4	61	54.4
Loss due to moisture content of fuel	0	0	0	0	0	0	0	0	0	0	0	0
Loss due to moisture formed in burning H2	1,363	1,370	1,402	1,458	1,509	1,534	7.1	7.1	7.3	7.6	7.8	8.0
Loss due to moisture in air	20	22	35	34	42	52	0.1	0.1	0.2	0.2	0.2	0.3
Loss in dry chimney gases	1,431	1,545	1,669	2,314	2,924	2,987	7.4	8.0	8.7	12.0	15.2	15.5
Loss due to radiation from heater and smoke pipe	418	444	369	406	389	372	2.2	2.3	1.9	2.1	2.0	1.9
Loss due to incomplete combustion of C	0	0	0	0	0	0	0	0	0	0	0	0
Convection and unaccounted for losses	2,659	1,558	1,886	1,858	2,644	3,821	13.8	8.2	9.8	9.7	13.8	19.9
Total heat value of fuel as fired	19,236	19,236	19,236	19,236	19,236	19,236	100	100	100	100	100	100
Combustion Rate, lbs. per hour	8.09	8.76	11.83	14.76	19.98	22.24	8.09	8.76	11.83	14.76	19.98	22.24
Combustion Rate, gals. per hour	1.137	1.231	1.663	2.074	2.808	3.126	1.137	1.231	1.663	2.074	2.808	3.126

TABLE 4—COMPARATIVE HEATING EFFECT, FLUE TEMPERATURES, AND EFFICIENCY OF FOUR-SECTION AND SIX-SECTION HEATER

Combustion Rate		4-Section Heater			6-Section Heater			Per Cent		
								Increase for 6-Section Heater		Reduction for 6-Section Heater Flue Temp. F°
Pounds Per Hour	Gallons Per Hour	Efficiency Per Cent	Heating Effect	Flue Temp. F°	Efficiency Per Cent	Heating Effect	Flue Temp. F°	Efficiency Per Cent	Heating Effect	
10	1.405	61	120,000	545	73	140,000	380	12	16.7	30.1
14	1.970	52	146,000	710	70	190,000	510	18	30.0	28.2

bowl. It is essential with the type of boiler used in order to obtain highest efficiency that the heated products of combustion meet the fire pot heating surface as low as possible above the grate level.

While no tests were run to determine the highest possible combustion efficiency obtainable with this burner, a 10% content being considered to represent a conservative figure consistent with residence installations, yet a carbon dioxide content of 13.9% was obtained. This would indicate that the A.B.C. burner is capable of operating at better than 90% combustion efficiency. This is due in large measure to the fine atomization obtained with this burner.

Highest overall plant efficiency was obtained with this burner when fuel was consumed at the rate required to produce a heating effect equal to approximately 60% of the rated capacity of the boiler.

(*Next month's issue will contain details of two tests of a Kewanee boiler, using, in one case, a Winslow industrial-type oil burner and, in the other, a Johnson oil burner*).

Collecting Gas Bills Without Bothering the Consumer

Down in Portsmouth, Virginia, a plan to simplify the collection of gas bills has been tried out and proved practicable, by B. B. Ferguson, president of the Portsmouth Gas Company. In an article written for the American Gas Association *Monthly*, Mr. Ferguson tells how he secures prompt collection of nearly all the bills rendered, without any active participation on the part of the customer.

Knowing that the majority of bills are paid by check, arrangement was made with the customers so that they instructed their banks to honor drafts from the gas company for gas bills, as presented. The company then simply forwards all bills for gas to its own bank, with a draft attached to each bill. These drafts were then distributed to the banks patronized by the different customers, and these—being previously instructed—promptly made remittance to the account of the gas company. The receipted bill, with draft attached, is then placed with the customer's cancelled checks and, at the end of the month, is forwarded with them to the customer.

In the case of an error in the bill, or for any other reason, it is obviously a simple matter for the customer to take the matter up with the company and, of course, a special effort is made to rectify any difficulty that may arise. Mr. Ferguson reports that the plan is growing rapidly in scope and it is probable that a large percentage of the company's receipts will be handled in this manner. The plan is undoubtedly a clever one and there is no reason why it might not be applied to other lines, in substantially the same way.

For Greater Stability and Better Standards of Business Practice

The general plan for the self regulation of business and the establishment of ethical and economic standards was presented at the National Distribution Conference at its general meeting in Washington, December 16-17, 1925, under the auspices of the Chamber of Commerce of the United States. More than 50 trade associations and executive officers of important industrial corporations were represented on the committee which made the report outlining the plan. The primary objective is the elimination of waste in distribution, but to accomplish this it proposes the building up of institutional machinery by business men for the regulation and stabilization of their own affairs, with the ultimate object of reducing to a minimum the cost to the public of the products it consumes.

The principal features of the plan, as outlined, are:

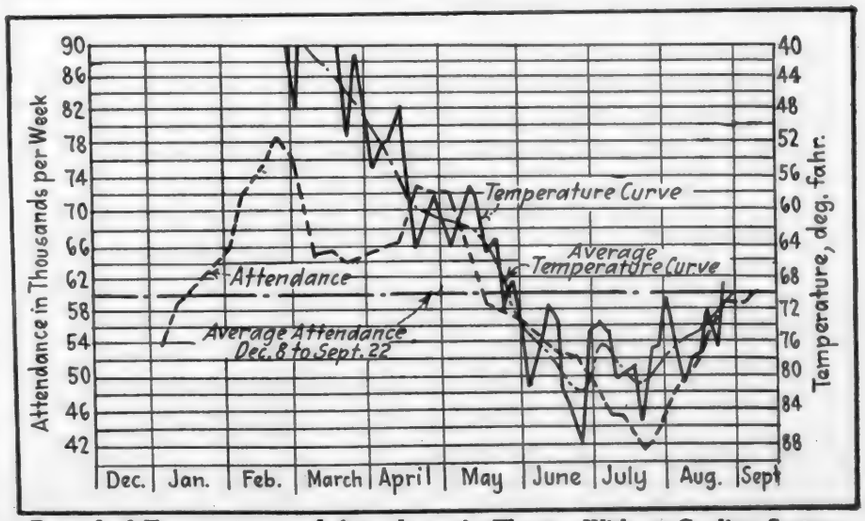
1. The formation of a Joint Trades Relation Committee constituting in effect a supreme court or clearing house of business.

2. The further development and enforcement of trade standards within particular trades, through the formulation of effective codes of practice.

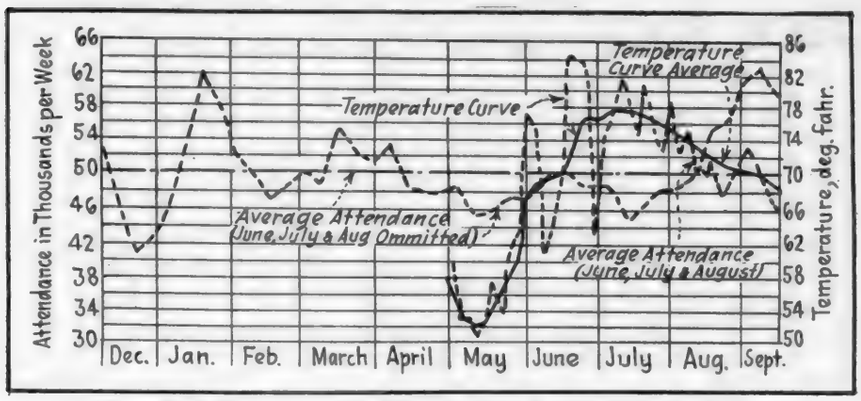
3. The further development of arbitration machinery within particular trades, for the direct adjustment of disputes and the prevention of costly litigation.

How Theatre Cooling Pays for Itself

Some convincing arguments in favor of the cooling of theatres in warm weather are supplied in the accompanying charts which show how directly attendance is affected by high indoor temperatures. Perhaps the most striking deduction to be drawn from the curves is that a cooling system pays in dollars and cents. This is brought out very clearly by comparing the weekly average attendance during the three hot



Record of Temperature and Attendance in Theatre Without Cooling System



Record of Temperature and Attendance in Cooled-Air Theatre

months with the weekly average attendance during the cooler season.

It will be seen that the loss in admissions during one season exceeds the entire installation cost of a cooling plant, plus one season's operating cost. This is based on a plant of not less than 50 to 60 tons capacity of refrigeration to each 1000 seats, maintaining a temperature within the theatre 10° or more below the outdoor temperature and regardless of the size of the audience.

The foregoing notes and the accompanying charts appeared in *Variety* for June 24, 1925, under the authorship of D. D. Kimball.

Craftmanship in Oil Burner Installations

It is apparently a matter of considerable pride with some organizations selling oil burners, to make installations as perfect as possible, as is evidenced by the photograph of a residential plant in New York State. A Winchester boiler, fired with a Nokol burner, supplies heat to the house, and the service water is heated in an Abendroth water-heater, fired with a small Nokol burner. Because of the fact that the water tank, heater and the boiler were in such close proximity, the installation man, in encasing them with insulation, made a unit job of it. It is obvious that the floor has not been completed, the disposition of the pipes being such that they will come below this level when the final concrete is poured. As has frequently been emphasized in THE HEATING AND VENTILATING MAGAZINE, proper and careful installation are vital points, and in this instance it would appear that every effort has been made to produce a high-class unit.

New Books

INTERNATIONAL CRITICAL TABLES OF NUMERICAL DATA OF PHYSICS, CHEMISTRY AND TECHNOLOGY, is an elaborate publication in five volumes, sponsored by The National Research Council, with headquarters in Washington, D. C., and on which work has been going on for several years. The material contained in these volumes has been collected and critically evaluated by three hundred co-operating experts, including chemists, physicists and engineers of the United States, Canada, Great Britain, Belgium, France, Italy, Austria, Germany, Denmark, Switzerland, Holland, Australia and Japan. Including a rational value of services of these experts, and other editorial expenses already involved, the total cost to-date represents about $500,000. The work will be issued in five volumes comprising an estimated 2500 pages, 8½ x 11 in., bound in reinforced buckram. The International Critical Tables will be published at the price of $60.00 for the five-volume set. However, until the appearance of Volume 1, early in 1926, individuals who are members of a recognized scientific or technical society may secure a set at the rate of $35.00 for the five volumes.

DRAFTING METHODS, by Douglas S. Trowbridge, assistant professor at New York University, designed especially as a reference book for draftsmen, is the title of a useful volume which will be welcomed by many in the drafting field. Much of the material has been used by Professor Trowbridge in his class work and represents many years' experience. Two unique chapters are included on instrument "kinks" and drafting "kinks." These time and labor-saving suggestions will be found well worth the study of those who are called upon at times for "rush" work. The first two chapters are devoted to drawing instruments and their use. The chapter on lettering explains various methods designed to save time and insure good work. Other chapters deal with symbols and abbreviations, filing methods, "nevers" and "don'ts". Size 5½ x 8 in. Pp. 156. Published by the Codex Book Co., Inc., New York, or may be had through the book department of THE HEATING AND VENTILATING MAGAZINE.

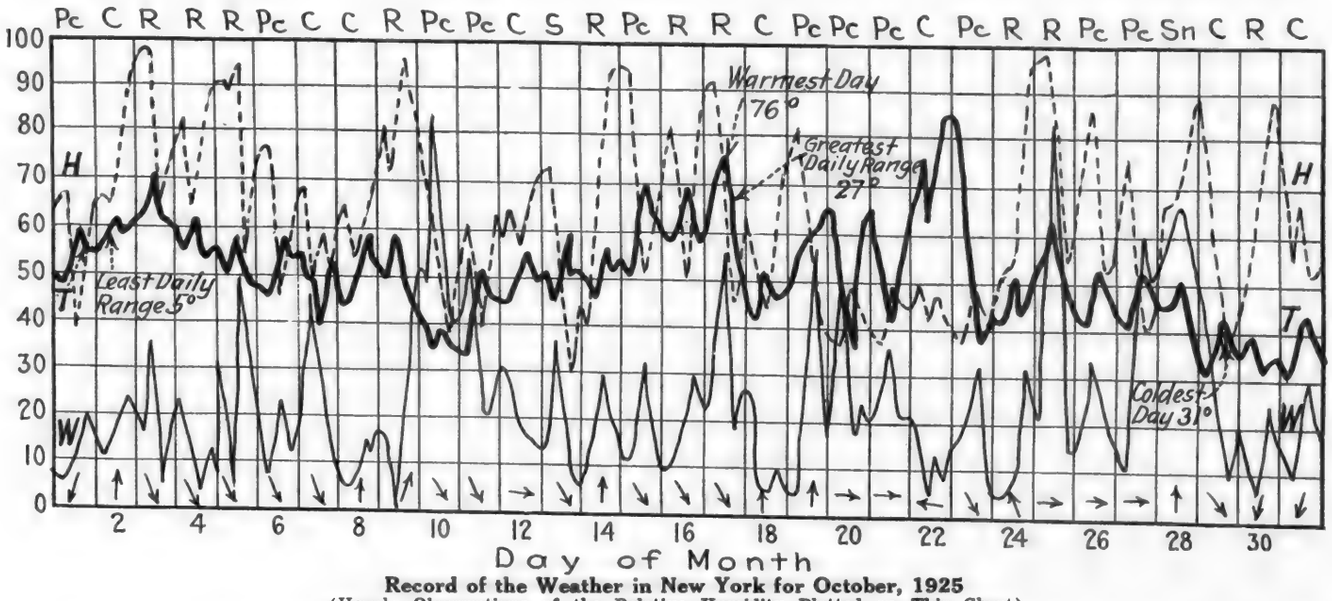
Patent and Trade Mark Law in Condensed Form

PATENTS, LAW AND PRACTICE, and Trade Marks, Trade Names and Unfair Competition, are the titles of two publications recently issued, respectively, in third and fourth editions by Richards and Geier, patent and trade mark attorneys, New York. It would seem from examination of the index that the information contained in these booklets covers practically all of the questions that might be asked in regard to the fundamental laws and practice in regard to patents and trade marks. In the initial preparation of this material they were designed to furnish information to manufacturers, merchants and those generally interested in the subject of inventions and their proper and adequate protection. The authors have condensed and presented the rather hazy realm of patent lore into brief lucid statements, covering each point. The text is broken up by heads and paragraph heads, printed in bold-faced type, so that the essence of the matter may practically be taken from the paragraph headings. Copies of these publications are available, upon request, to Richards and Geier, 277 Broadway, New York.

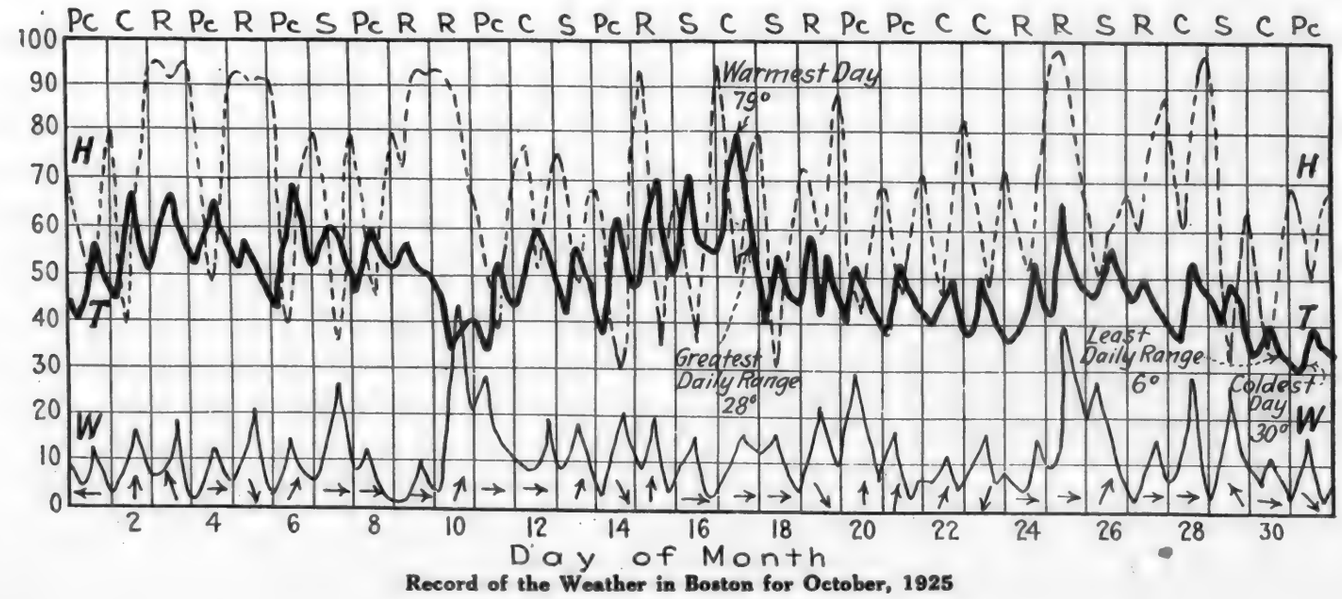
OFFICIAL BULLETIN OF THE HEATING AND PIPING CONTRACTORS NATIONAL ASSOCIATION for November has, as a leading article, "The Fallacy of the Old-Fashioned Winter," by William H. Driscoll, vice-president of the association. As the result of the collection and tabulation of a considerable amount of data, Mr. Driscoll shows that the so-called "hard winters" were largely imaginary, and did not exist in terms of temperatures recorded by the United States Weather Bureau. The issue also contains an article, "The Question of Credit," by Howard E. Jones, of the National Trade Extension Bureau.

The Weather for October, 1925

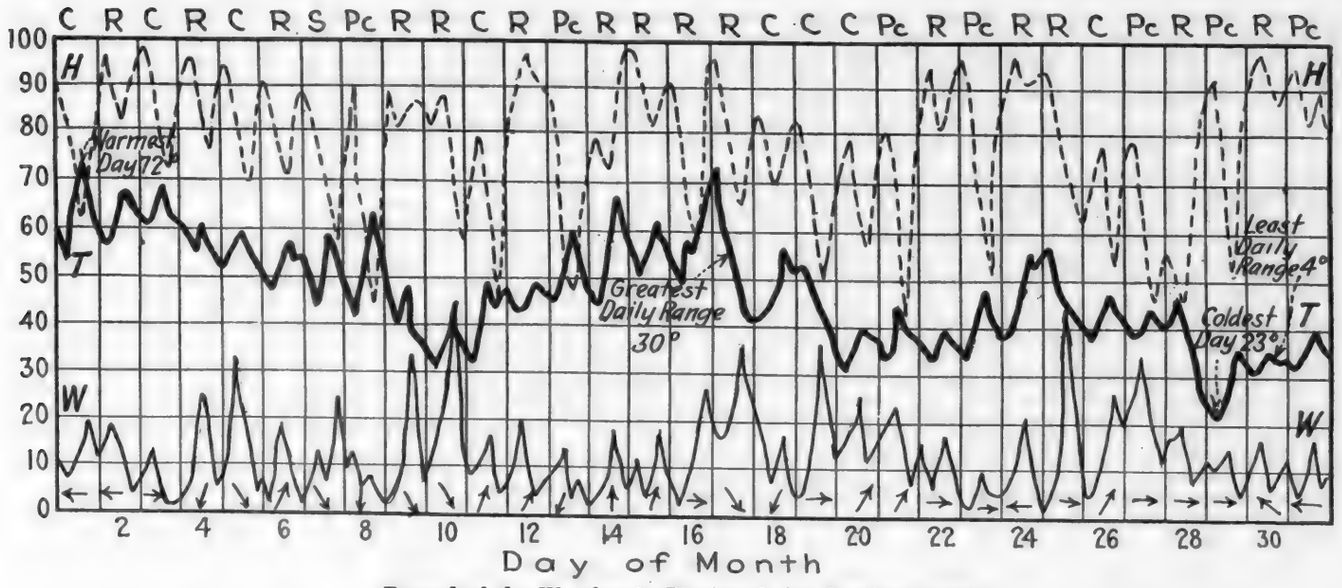
	New York	Boston	Pittsburgh	Chicago	St. Louis
Highest temperature, deg. F	76	79	72	70	80
Date of highest temperature	17	17	1	1	2
Lowest temperature, deg. F	31	30	23	19	21
Date of lowest temperature	29	31	29	28	30
Greatest daily range, deg. F	27	28	30	18	21
Date of greatest daily range	17	17	17	18	23
Least daily range, deg. F	5	6	4	5	2
Date of least daily range	2	30	30	3	12
Mean temperature for month, deg. F	49.8	49.3	47.2	45.0	49.5
Normal mean temp. for month, deg. F	56.3	53.6	55.6	55.1	58.8
Total precipitation, in	4.13	4.03	4.09	3.72	4.32
Normal precipitation, this month, in					
Total snowfall, in	0.4	T	4.9	1.2	0.1
Normal precipitation, this month, in	3.71	3.86	2.36	2.55	2.41
Total wind movement for month, miles	14367	7535	7840	7105	8101
Average wind velocity, miles per hour	19.3	10.1	10.5	9.5	10.9
Prevailing direction of wind	N.W.	W.	W.	N.W.	S.
Number of clear days	5	6	1	4	4
Number of partly cloudy days	13	14	7	6	9
Number of cloudy days	13	11	23	21	18
Number of days with precipitation	13	11	17	17	10
Number of days with snow	1	1	3	1	1
Snow on ground at end of month, in	None	Trace	None	None	None


Pc C R R R Pc C C R Pc Pc C S R Pc R R C Pc Pc Pc C Pc R R Pc Pc Sn C R C
Warmest Day 76°
Greatest Daily Range 27°
Least Daily Range 5°
Coldest Day 31°
H
T
W
Day of Month

Record of the Weather in New York for October, 1925
(Hourly Observations of the Relative Humidity Plotted on This Chart)


Pc C R Pc R Pc S Pc R R Pc C S Pc R S C S R Pc Pc C C R R S R C S C Pc
Warmest Day 79°
Greatest Daily Range 28°
Least Daily Range 6°
Coldest Day 30°
H
T
W
Day of Month

Record of the Weather in Boston for October, 1925


C R C R C R S Pc R R C R Pc R R R R C C C Pc R Pc R R C Pc R Pc R Pc
H
T
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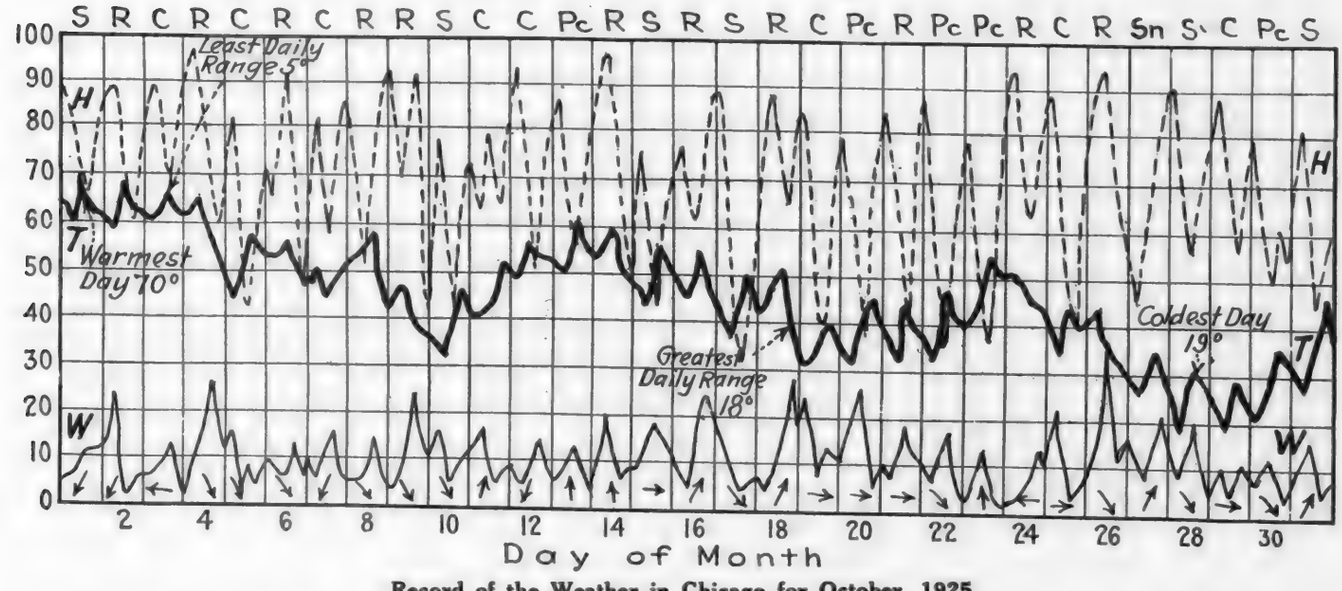
Warmest Day 72°
Greatest Daily Range 30°
Least Daily Range 4°
Coldest Day 23°
Day of Month

Record of the Weather in Pittsburgh for October, 1925


S R C R C R C R R S C C Pc R S R S R C Pc R Pc Pc R C R Sn S C Pc S
H
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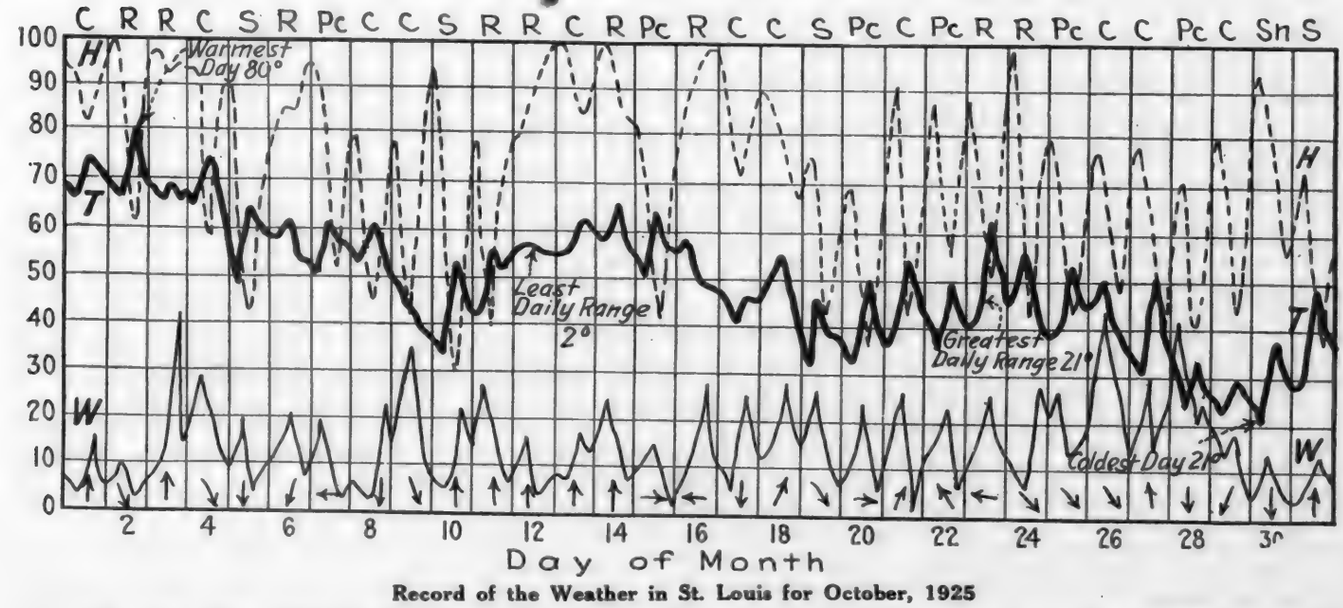
Least Daily Range 5°
Warmest Day 70°
Greatest Daily Range 18°
Coldest Day 19°
Day of Month

Record of the Weather in Chicago for October, 1925


C R R C S R Pc C C S R R C R Pc R C C S Pc C Pc R R Pc C C Pc C Sn S
H
T
W
Warmest Day 80°
Least Daily Range 2°
Greatest Daily Range 21°
Coldest Day 21°
Day of Month

Record of the Weather in St. Louis for October, 1925

Plotted from records especially compiled for THE HEATING AND VENTILATING MAGAZINE, by the United States Weather Bureau.
Heavy lines indicate temperatures in degrees F. Light Lines indicates wind in miles per hour.
Broken Lines indicate humidity in percentage from readings at 8 A. M., 12 M., and 8 P. M.
S—Clear, PC—partly cloudy, C—Cloudy, R—rain, Sn—snow. Arrows fly with prevailing directions of wind.

American Society of Heating and Ventilating Engineers

Kansas City Chapter Takes Lead in Movement to Change Society's Constitution

A MOVEMENT which has been gathering headway among the western chapters of the American Society of Heating and Ventilating Engineers, with the object of giving the western members a better representation in its councils, reached the heavy artillery stage when the Kansas City Chapter, at its meeting October 14, took a definite stand on the subject.

The fireworks started with the report of John H. Kitchen, chairman of the chapter's legislative committee. Mr. Kitchen explained that, due to his position on the society's nominating committee, he would devote his report to what he considered needed legislation within the society.

Mr. Kitchen called attention to the minority report of the society's nominating committee in which the western members had taken a stand for equal representation on the council. He pointed out that since 50% of the membership is west of Pittsburgh, the society may no longer be considered an eastern organization. He considered that the nominating committee's report had resulted in an inequality or unbalancing in the nominations for national officers, resulting in an apparent monopolization of these offices by the eastern members. He characterized the resulting situation as "taxation without representation" and felt that there was urgent need of revising the society's by-laws to insure a more equal representation.

Mr. Kitchen's report was endorsed unanimously by the chapter and a resolution to that effect was adopted. It was then voted to send copies of the resolution to all the other chapters. The resolution reads:

Whereas: The report of John H. Kitchen, Kansas City member of the Nominating Committee for the 1926 officers and council of the society, indicates that the society and its committees as now constituted are operating under restricted charter and by-laws;

Also: That under these conditions, it is self-evident that the growth of Western chapters will be retarded;

THEREFORE BE IT RESOLVED: That the Kansas City Chapter approves and endorses the position taken by the Western members of the Nominating Committee in demanding proper recognition of western members of the society.

BE IT FURTHER RESOLVED: That the Kansas City Chapter urge the importance of needed changes in by-laws whereby all members of the society, irrespective of locality, will have equal voice, vote, and opportunity in the transaction of business of the society.

Illinois Chapter Discusses Society Affairs

Some interesting expressions of the undercurrent of thought which has been spreading through many of the western chapters of the society, were given concrete form at the December meeting of the Illinois Chapter, held November 9, at the Hotel Sherman, Chicago.

J. C. Cutler outlined the growth of the society in the west, and stated that Cincinnati would soon have a chapter. He mentioned the fact that the Kansas City Chapter has passed a resolution approving and endorsing proposed changes in the society's by-laws to give fuller representation to western members in the affairs of the society. A letter from the Kansas City Chapter was read expressing the belief that the society was in danger of developing into an exclusively Eastern organization, and urging the changes as proposed.

Secretary Thomas mentioned the fact that a resolution had been introduced some time before at a meeting of the society which raised two points, one providing that proxies of the entire chapter memberships be vested in one member, and the other providing for the reincorporation of the society in a State like Delaware, thus permitting annual meetings to be held anywhere. This resolution, he said, had never received favorable consideration by the society.

Mr. Lewis expressed his belief that the New York members would readily agree to the suggested changes and would co-operate in the movement.

Homer Linn felt that there was strong objection on the part of eastern members to the proxy rule and he felt that unless action is forthcoming shortly along these lines, there was a likelihood of two separate heating engineering societies.

At Mr. Lewis's suggestion it was voted to have the chapter's Board of Governors get in touch with the western chapters and frame a resolution to be presented at the society's annual meeting in January.

Theodore Weinshank, retired member of Weinshank and Fenstermaker, of Indianapolis, Ind., and W. A. Russell, of the United States Radiator Corporation, were elected to membership in the chapter.

Samuel R. Lewis then presented a paper on "Distribution," illustrated by lantern slides of heating and ventilating equipment designed by him, incorporating his ideas of the application of the diffusion principle in ventilation.

Western New York Chapter

"Gas Heating by Induction" was the subject of an address by L. Lipman, at the November meeting of the Western New York Chapter, held at the Hotel Buffalo, November 2. Other speakers at this meeting were: R. C. Parlett, engineer for Johns-Manville, Inc., who spoke on "Certain Products of Their Manufacture," illustrated by lantern slides.

L. A. Harding, of Buffalo, gave an interesting talk on the heating, ventilating and air conditioning of the Buffalo plant of The American Lithographing Company. Mr. Harding was the engineer and contractor for this plant.

The following committees were announced for the society's annual meeting, to be held in Buffalo in January:

General chairman, W. G. Fraser; treasurer, Roswell Farnham; publicity, C. W. Farrar; entertainment, C. H. Love; registration, C. P. Wadley; reception, George H. Drake; speakers, F. B. Howell; hotel and transportation, H. P. Dempsey; ladies, Mrs. C. H. Love.

A letter was read from William E. Bullock, secretary of the Oil and Gas Power National Conference, to be held April 19-24, asking for the chapter's cooperation. This matter was left in the hands of the secretary and chairman of the program committee.

President Fraser read a letter from the Research Laboratory of the A.S.H. & V.E., regarding the question "Cannot the steam-type of radiator be abandoned and the hot-water type used exclusively for both steam and hot water?" It was decided to have copies of this communication sent to each member of the chapter, asking him to send to the secretary his opinion or, if time permitted, to turn over a portion of the December meeting for discussion of this question.

At the close of the meeting those present had the pleasure of listening to a radio receiving set which had been installed by Mr. Harding. This proved a novel feature, and was very much appreciated.

Wisconsin Chapter

At the October meeting of the Wisconsin Chapter the guest of honor was President Samuel E. Dibble. President Dibble gave an interesting talk on matters of general society interest, stressing

particularly the society's Code of Minimum Requirements, and the work of the Research Laboratory.

For the November meeting a program was arranged by F. R. Dannies, chairman; John Jung and J. J. Kelly.

Program for Wisconsin Chapter

The program of the Wisconsin Chapter for the remainder of the season, has been announced as follows:

December—Professor A. C. Willard, of the University of Illinois. (Subject to be announced.)

February—Samuel R. Lewis, of Chicago.

April—Dr. E. Vernon Hill, of Chicago.

The subjects and speakers for the January and March meetings are still to be announced.

The committee for the January meeting is made up of Fred G. Weimer, chairman, C. J. Rice, and William F. Noll. The committee for the March meeting is composed of H. E. Schwab, J. C. Wolf and F. H. Meadows. The May meeting committee is composed of H. W. Page, chairman; Rudolph Zuehlke and H. R. Cook.

The June meeting will be devoted to a golf tournament and dinner.

Elimination of Steam-Type Radiators Predicted at Meeting of New York Chapter

THE presence of Dr. Charles A. Brabbee, the distinguished Austrian heating and ventilating engineer, who is at present in this country acting as director of the American Radiator Company's Research Laboratory in Yonkers, N. Y., and Dipl.-Ing. A. Margolis, representing Rud. Otto Meyer, of Hamburg, Germany, one of the largest central station heating concerns in Europe, gave an international touch to the November meeting of the New York Chapter, which was held November 16 at the quarters of the Building Trades Club. The principal speaker of the evening was F. R. Still, vice-president of the American Blower Company, whose subject was "Past and Present Trend in Fan Design and Its Application to Industry."

Both Mr. Margolis and Dr. Brabbee were invited by President A. A. Adler to address the meeting. Mr. Margolis expressed his appreciation of meeting so many heating men and of the pleasure his visit to the United States had given him.

Dr. Brabbee told of his research work at the American Radiator Company's Research Laboratory, especially in connection with the proposed elimination of the steam type of radiator.

The principal difficulty, he said, had been found in connection with one-pipe steam heating systems, due to air binding in water-type radiators. By plugging a portion of the end section this difficulty had been obviated and he was now in a position to recommend the elimination of the steam-type radiator from the market.

Mr. Still, in his address, gave an extensive review of the history of the fan industry, covering many of the points which were presented in a special article, dealing with Mr. Still's career, which appeared in THE HEATING AND VENTILATING MAGAZINE for May, 1924.

As examples of early types of installations which are still in operation, Mr. Still cited the old fan in Trinity Church, New York, and the equipment in the Metropolitan Opera House, in New York, and in the Opera House in St. Paul, Minn. Those interested in early designs, he said, would be well repaid by a visit to these plants.

He reviewed the history of the Smead system and told how its use had been discontinued, due to the fact that back drafts were possible from toilet rooms to which the system was connected. He spoke of the development of the company's Pitot tubes and said that one of the greatest needs at present is the determination of air velocities necessary to remove materials in pipes and ducts.

He told of the early efforts to learn the application of the necessary amount of moisture to air when drying substances such as lumber and brick. These quantities, he said, are now well known, but in the early days they were a matter of considerable doubt. He referred, in an interesting way, to the invention of the Sirocco fan, Vento radiation and unit heaters. On the latter subject, he expressed his opinion that unit heaters have come to stay for certain classes of work, but he doubted their suitability in public buildings.

He also spoke of the increased pressures that are being used, especially in connection with induced and forced draft fans.

Of the subject of couplings, Mr. Still decried the use of flexible couplings, and urged that, wherever possible, couplings be made rigid.

Mr. Still then drew a number of sketches on the blackboard, one of which showed an interesting kink in the form of a throttling device in the main air duct to control the air velocity, irrespective of the speed of the fan.

In the ensuing discussion A. A. Cary expressed the opinion that it was poor practice to increase the air pressure in fan operation when the real difficulty is in the furnace. He showed how proper stoker design will obviate the need of high pressure fans.

Technical Advisory Committee for the Research Laboratory

Following is the personnel of the Technical Advisory Committee, of the Committee on Research, as announced by W. H. Driscoll, chairman of the Committee on Research of the A.S.H & V.E.:

Temperature, humidity and air motion: W. H. Carrier, chairman; E. V. Hill, Burt S. Harrison, F. Paul Anderson, W. L. Fleisher, John F. Hale and E. S. Hallett.

Radiation: R. V. Frost, chairman; R. C Bolsinger, Dr. Charles Brabbee, G. M. Getschow, E. H. Lockwood, J. F. McIntire, R. B. Rowley and R. B. Dickson.

Infiltration: A. C. Willard, chairman; W. S. Timmis, L. A. Harding, E. B. Langenberg, K. Boyd, L. F. Kratz and H. J. Meyer.

Pipe sizes: F. C. Giesecke, chairman; C. F. Eveleth, vice-chairman; H. M. Hart, J. A. Donnelly, W. L. Durand, J. E. Emswiler, C. V. Haynes, J. H. Walker and J. M. Dugan.

The Radiation Committee will have charge of the tests of steam and water pipe radiators the purpose of determining their relative efficiency. The Pipe Size Committee, will take up critical velocities. The Committee on Infiltration will map out additional tests in connection with air leakage around windows and through building materials.

Autumn Meeting of British Heating Engineers

The autumnal general meeting of the Institution of Heating and Ventilating Engineers was held in London October 6, and was presided over by Alcwyn A. Jones, president. The institution elected as president for 1926, Oswald Stott of Leicester, and filled the vacant third vice-presidency, by the election of J. Roger Preston, of London.

In connection with the research work which has been for many years conducted at University College, under a special grant of the Department of Scientific and Industrial Research, it was reported to the Institution that the department had declined to continue its annual grant of £550 for this work. As it was found impossible to make any satisfactory arrangement with the Department, the Institution reluctantly decided to suspend research work at the college.

Efforts are being made to arrange for a continuation of this work, under the direction of Mr. Herring, and the Institution extended a vote of thanks

to him for his valuable help as chairman of the Research Committee.

E. Ower, of the National Physical Laboratory, read a paper on "The Practical Measurement of Air Flow." The paper was devoted to a consideration of practical methods by which pressures may be measured, particularly in the field, and consisted of a summarization of known methods, with comments on the accuracy and ease with which each might be used.

The use of Pitot and Venturi tubes was explained and the advantages of, and objections to, each discussed. Mr. Ower then described mechanical anemometers as instruments mainly of value for measuring air speed in large open-ended ducts, or ventilating shafts. He explained, at length, the care that must be taken in securing accurate observations and concluded his paper with notes on the calibration of manometers, and on tests for leakage. Following a discussion of the paper, a vote of thanks was given to Mr. Ower.

Progress of Investigations at A. S. H. & V. E. Research Laboratory

DETAILS of the new investigations under way at the Research Laboratory of the American Society of Heating and Ventilating Engineers are given in a statement issued by William H. Driscoll, chairman of the Committee on Research. An outline of the program was presented in last month's issue.

Under Problem A, which deals with the testing of steam and water-type radiators to determine their relative efficiencies, particularly when used on one-pipe jobs, the statement says:

"This problem has been initiated as a direct result of the efforts of the Department of Commerce at Washington to arouse an interest in simplification and elimination of waste in manufacture. The radiator manufacturers have signified their willingness to abandon the manufacture of the steam type of radiator if this can be accomplished without any detrimental results.

"The Laboratory is the logical place to obtain the necessary answer to this problem and the matter is of such immediate and far-reaching importance that we are taking hold of it at once in the belief that in a very short time we will be able to issue a statement with a voice of authority that will bring into complete harmony the conflicting ideas that seem to prevail in the industry at this time with respect to this matter."

Problem B, dealing with critical velocities, will be taken up along the lines suggested by the Heating and Piping Contractors National Association to include piping of larger sizes.

In connection with Problem C dealing with infiltration, the statement is made that "possibly no subject in the heating industry has been the cause of so much controversy, discussion and disagreement as the question of infiltration and air leakage. Some tests have been made in the past with this problem, but the work had to be suspended owing to lack of funds. We are taking up this work again and will carry it on to completion as actively as possible."

Regarding Problem D, temperature, humidity and air motion, the statement declares that "it is our belief that no work the Laboratory has ever done has engaged such world-wide attention as that accomplished in co-operation with the U. S. Public Health Service on this problem. This work has been under way for a number of years and further investigations and studies will be made until we feel that the field has been covered as completely as possible."

In connection with each of the problems mentioned and with all problems that are hereafter to be investigated at the Laboratory technical advisory committees will be appointed, to give the director and his assistants at the Laboratory their counsel and advice, and the benefit of their practical knowledge and experience. In the future, it is added, no work will be undertaken until such a committee has had an opportunity to analyze and study the problem and determine on the method of procedure and, in general, to act in an advisory capacity. The committee will likewise assume responsibility for the progress of the work and assist in the preparation of the papers and reports issued from the Laboratory. "Consideration is being given," continues the statement, "to the possibility of extending the scope of the Laboratory's activities and by Spring of next year we expect to be engaged in investigations of many other important problems.

PLANS INCLUDE RESEARCH RESIDENCE IN PITTSBURGH

"Among other things, we hope to establish an experimental house or Research Residence at Pittsburgh in which most exhaustive investigations will be made with respect to the many problems that enter into heating the home. We have not as yet solved the problem of financing the construction of this building, but under no circumstances will an appeal be made to the general membership for this purpose, nor will any of the normal funds of the Laboratory be diverted to it."

"We have emerged triumphantly," concludes the statement, "from the leanest and most distressing period in the history of the Laboratory, but our condition to-day is absolutely the healthiest it has been at any period."

Mid-Year Meeting of the National Warm-Air Heating and Ventilating Association

An inspection of the Warm-Air Heating Research Residence and of the experimental work being conducted there was an outstanding feature of the mid-year meeting of the National Warm-Air Heating and Ventilating Association, held in Urbana, Ill., December 1-2.

The program included a review of the work of the Publicity Committee, by E. F. Glore, chairman; the report of the code committee, Professor J. D. Hoffman, chairman; and the report of the legislative committee, A. P. Lamneck, chairman. An account of the meeting will appear in next month's issue.

Condensed Summary of Data Obtained on House Heating with Warm Air At the University of Illinois

One of the most usable bulletins that has appeared on any engineering topic, has been prepared by the National Warm-Air Heating and Ventilating Association, summarizing the results obtained by co-operative research in house heating, between the association and the University of Illinois. Whoever devised the plan of presentation deserves unstinted commendation, as on four pages there has been condensed the meat of four complete bulletins of the University of Illinois. These are presented in staccato paragraphs, under several classifying heads, and in the margin of each paragraph is listed the bulletin number and page number from which the paragraph was obtained. Data are classified under the following heads: The Furnace, Leaders, Ducts, Velocity, Humidity and Registers.

Sanitary and Heating Engineering Changes Hands

Announcement is made that *Sanitary and Heating Engineering*, established in 1920 by the Edwin F. Scott Publishing Company, of New York, and since published by that firm, has been purchased by Charles B. Hayward and H. K. Hottenstein. Mr. Hayward was formerly president of *Fire and Water Engineering*, a weekly journal published in New York. Mr. Hottenstein was for many years connected with the McGraw-Hill Company and later had charge of *Mining and Metallurgy*, published by the American Institute of Mining Engineers. The new owners have organized the Plumbing, Heating and Ventilating Publishing Company, with offices at 235 West 34th Street, New York, where *Sanitary and Heating Engineering* will now be published. It will be issued hereafter as a monthly, instead of a bi-weekly.

C. A. Moore Residence in Minneapolis, Insulated with 5700 Sq. Ft. of 2-in. Armstrong Corkboard on Roof and Outside of Walls—Stucco Finish

House Insulation and Its Relation to Heating

By H. B. Gates

THE increasing use of insulation in the walls and roofs of American homes indicates a growing appreciation that it is one thing to generate heat for the home, but another to use that heat with any degree of economy. Heating engineers and architects are becoming converts to the idea, and demonstration houses erected in various cities are serving as irrefutable object lessons in the economy of insulation.

Since wall and roof losses are an important factor in determining the amount of radiation, it is obvious that any material reduction of these losses must be reflected in the calculations, and affect the size of the plant that will be required. Hence, the relation between these two subjects, heating and insulation, is a very close one and well worth the serious attention of all who design and install domestic heating systems.

Until recently no serious effort, generally speaking, has been made to correct the heavy heat losses through house construction. Occasionally houses have been built, particularly in far northern climates, in which some really effective insulation has been used, but these were exceptions. Usually even the better class of houses have had no provision for reducing heat transmission other than the structural material used, or at most, a layer of paper or "air spaces." The paper, of course, served no other purpose than as a windstop, being entirely too

Applying Corkboard to Underside of Roof
(Residence of G. Jungling, Cincinnati, O.)

Two-Inch Corkboard Applied to Tile Walls and Second-Floor Ceiling
(Residence of H. W. Prentis, Jr., Lancaster, Pa.)

thin to have any real insulating value. Air spaces cannot be built with wood or masonry small and tight enough to be of any real worth as insulation. As a result, the heat losses through such construction have been very high, and a considerable part of the radiation figured for a house is required for the purpose of supplying the amount of heat necessary to offset this leakage.

INSULATED CONSTRUCTION REQUIRES NEW HEAT LOSS COEFFICIENTS

Now that conditions are changing and houses are being built with really adequate insulation in exterior walls and roof, or top-floor ceiling, the heating estimator will almost certainly be under the necessity of altering his calculations accordingly. If less heat is lost, less need be supplied, and less radiation will be required. The careful estimator should therefore be very fully informed as to just what effect insulation does have when added to walls and roofs of the various types of construction. Judging by the rapidity with which the principle of insulation is being accepted by architects, contractors and home builders, heating contractors are going to be called upon to base their estimates on heat loss factors greatly different from those heretofore generally accepted.

For example, let us take a solid brick wall, 8 in. thick, with furring strips, lath and plaster. The transmission per square foot per degree difference in temperature, per hour is 0.21 B.T.U. An 8-in. brick wall without furring strips and lath, insulated with 1½ in. of corkboard and plastered transmits 0.10 B.T.U., a reduction of little more than 52%. A wall of 7/16-in. clapboards, ¾-in. sheathing, studding, lath and plaster, transmits, on the same basis, 0.23 B.T.U. Omitting the lath and adding 1½ in. of corkboard, the heat transmission is reduced to 0.11 B.T.U., or about 52%. The transmission through a roof of shingles, sheathing or T. & G. boards, and rafters is 0.35 B.T.U.; with the addition of 1½ in. corkboard plastered, 0.13 B.T.U., or 63%.

Obviously such reductions as these in the amount of heat leakage must be reflected in the results of any heating estimate that is based on calculation and not on mere rule-of-thumb methods of arriving at capacities required.

INSULATED HOUSE INVARIABLY PLEASES OCCUPANT

There are two aspects of house insulation of immediate concern to the heating contractor:

The greatly increased heat retention of the insulated construction enables the plant to operate much more efficiently. It not only uses less fuel, but it heats the house much more uniformly. There is no complaint about rooms that are "hard to heat"; the north side is just as warm as the south side, upstairs is as comfortable as the lower floor. The closed portion of the house stays warmer overnight and cold bedrooms warm up quickly when the heat is turned on in the morning. The natural reaction of the occupant to such results is the conviction that he has a mighty good plant, and the heating contractor gets the credit for a first-class job.

The insulated house is so much more easily heated that the contractor can and does figure a smaller plant than he would otherwise. At first glance this might seem to be a disadvantage in that the unit of sale would be smaller. But such a view is shortsighted and entirely neglects the prestige and good will that accrue to the contractor who is thus enabled to pass on to his client a considerable saving in cost. Every business is and must be founded upon the good will of its customers. The heating engineer who can give a better service and at the same time save his client money soon finds himself outside the zone of cutthroat competition. Business comes to him easily through the endorsement of satisfied customers.

While it is true that the heating contractor or engineer seldom, if ever, has anything to do directly with specifying the construction, the two are so interrelated that the man who pretends to keep himself and his business up to date cannot afford to pass this development by as of no concern to him. It does concern him very much indeed, and affects his business to as great an extent as would some important improvement in heating apparatus.

It is certainly to the advantage of the heating contractor to install his equipment under conditions that are most favorable to its efficient operation—low first cost, low fuel cost, and dependable, uniform heating. Hence, the entire heating industry is vitally interested in the development of house insulation and will be greatly benefited by informing itself fully on the details of materials used and results accomplished. The corkboard for which heat loss coefficients are given above, is that made by the Armstrong Cork and Insulation Company, Pittsburgh.

Timken-Detroit Company Will Develop Oil Burner

In direct contrast to the flamboyant sales plans of many of the oil burner companies, is the announced policy of the Timken-Detroit Company, Detroit, which has recently taken over rights for the manufacture of the Timken-Arrow oil burner, and for its sales throughout the greater part of the United States. The acquirement of the Arrow burner from the Socony Burner Corporation by this company, long established in the automotive field, is but another indication of the increasing stability of the domestic oil burner industry.

It is in line with the policy of such an organization to proceed on a conservation schedule of expansion, based more on the ability of the company to properly extend its sales and service organization, than upon the capacity of the public to absorb burners. It will probably be the policy of the Timken-Detroit Company to initiate a sales campaign, through the medium of local branches, located in such centers of population as have the greatest oil burner purchasing power, and the later development of dealer relationship in smaller communities. The company's policy is based on the fact that a dealer in Timken-Arrow burners, who is forced to go out of business, becomes a decided liability against the good-will enjoyed by the organization. It being axiomatic that a dealer must make a profit in order to remain in business, it becomes incumbent upon the Timken-Detroit Company to formulate such a sales plan, in its entirety, as to insure a reasonable profit to its dealers.

With this thought in mind, the Timken-Detroit Company has secured the services of F. W. Hvoslef, to be in charge of the heating engineering division. The function of the engineering department will be the determination of house-heating conditions throughout the country, as a basis for development work in the manufacture of the burner. Mr. Hvoslef is a graduate of the University of Minnesota and received a master's degree after a post-graduate course in heating and ventilating engineering. Prior to his association with the Timken-Detroit Company, Mr. Hvoslef was assistant to the chief engineer of the United States Radiator Corporation.

It is obvious, from this outline of policy, that the Timken-Detroit Company is more concerned with the possibility of developing a substantial domestic oil burner business ten years from now, than the problem of selling all the burners that can possibly be built during the next year or two; and the entrance of this well-organized and strongly-entrenched organization into the domestic oil burner field, will undoubtedly be watched with a great deal of interest by the industry.

The Timken-Arrow burner will be manufactured in Detroit, and, until such time as production can be secured, burners will be supplied by the Socony Company. A training school for installation engineers and service men will be established at Detroit.

THE ART IN HEATING BY OIL OR GAS, is the title of an attractive little booket issued by Bryan Steam Corporation, Peru, Ind., describing the Bryant heat generator, a steam boiler designed specifically for use with oil or gas. The folder contains a detailed phantom view of the generator showing its copper-tube construction and indicating the points of superiority claimed for the generator.

"Students" at the Three-Day Institute at Carnegie Tech

240 Engineers and Contractors Turn Students at Carnegie Tech.

THAT the second annual institute for master plumbers and heating and ventilating engineers, held at Carnegie Institute of Technology, Pittsburgh, November 18, 19 and 20, was an unqualified success, is indicated by the representative character of attendance. The students came from all over Pennsylvania and Ohio, from LaFayette, Ind., Chicago, Oak Park, Ill., and, eastward, from Hartford, New Haven, New Britain and Putnam, Conn., and even from Boston. New York City and Utica were also represented. Thirty of the students were women. Heating and ventilating engineers, jobbers, city inspectors, contractors, manufacturers of plumbing fixtures and boilers, publishers and research workers were represented on the registry.

The three-day institute consisted of a series of lectures, demonstrations, inspection trips and exhibits. Among the institute "students" were representatives from the Universities of Illinois, Kentucky, Yale and Purdue, and the International Correspondence School. They studied the institute with reference to possible establishment of institutes at their schools for the benefit of the heating and plumbing industries in their section of the country.

The "students" met in the Carnegie Union where addresses of welcome were made by President Thomas S. Baker and Dr. C. B. Connelley. Luncheon was then served in the campus cafeterias.

The afternoon session began the practical lectures and demonstrations. The program included lectures on "Boiler Ratings," by Prof. S. E. Dibble, head of the Department of Heating, Ventilating and Sanitation, and on "Water Supply," by Prof. Harold L. Lang, Department of Biology and Public Health. Following dinner in the Carnegie Commons, the men, accompanied by their wives, made an inspection trip through Carnegie during night school.

Wednesday's program included lectures on "Traps, Trap Siphonage, and Venting," by Prof. Dibble; "Boiler Testing," by Prof. Roy B. Ambrose, head of the Department of Power Plant Operation; "Friction of Water," by Prof. H. A. Thomas of the Department of Hydraulics; "Chimney Sizes," by Prof. T. G. Estep, Department of Mechanical Engineering, and "Trade Literature and Reference Files," by Mrs. Blanche K. Wappat, librarian of Carnegie Institute of Technology.

To a combined assembly of men and women, motion pictures on "Saving Coal at Home" and "Ventilation Tests for Underground Tunnels" were shown through the co-operation of the United States Bureau of Mines.

"Contracts and Liens," by Clyde Armstrong, a Pittsburgh attorney at law, began Thursday's session. This was followed by lectures on "Boiler Testing" by Prof. Ambrose; "Combustion," by Prof. Lang, and the "Value of Research Work in the Plumbing Industry," by F. C. Houghten, director of the Research Bureau, American Society of Heating and Ventilating Engineers.

A special program of sightseeing and lectures was provided for wives of the "students," numbering nearly seventy.

Date Changed for Holding National Heating and Ventilating Exposition

Announcement is made that the date for holding the First National Heating and Ventilating Exposition, in the new Madison Square Garden, New York, will be March 17-23. The exposition was scheduled originally for the first week in February. In accordance with the new arrangement, the National Heating and Ventilating Exposition will follow shortly after the "Own Your Home" Exposition to be held at the same place in February.

Specialized Traffic Maps Available in New Publication

A new atlas of traffic maps has been published by La Salle Extension University, containing 86 maps, showing all important traffic routes throughout the United States. There are included 52 railroad system maps, comprising every important railroad in the United States and Canada. Maps of representative terminal and belt railroads also are included and all of the information regarding connections, has been brought up to date.

S. E. Dibble Appointed to New Ahrens Professorship at Carnegie Tech.

Theodore Ahrens, president of the Standard Sanitary Manufacturing Company, has realized a long-cherished dream, and Carnegie Institute of Technology, Pittsburgh, Pa., has become the first educational institution of standing to place plumbing, heating and ventilating on a plane with other branches of engineering. These accomplishments result from the endowment, by Mr. Ahrens, of a chair at Carnegie Institute, to be known as the Theodore Ahrens Professorship. Mr. Ahrens has been keenly interested for many years in the education of artisans in the plumbing and heating industries, and his gifts to trade schools and similar establishments have been generous in size and broadly distributed. In Louisville, Ky., is being built the Theodore Ahrens Trade School, at a cost of a quarter of a million dollars, and in Pittsburgh, Pa., special courses have been developed at one of the public schools in which nearly 200 apprentice plumbers are now studying. Baltimore, New Orleans, Cincinnati and other cities have benefited from this interest of Mr. Ahrens in the "man on the job." There is no gainsaying the fact that this step will have a great deal to do with elevating the status of plumbing and heating contracting, which have heretofore been considered as trades to be learned only by application and development from the apprentice stage. The work that will be done at Carnegie Institute under this endowment will undoubtedly offer opportunities for advancement and technical training to many a young fellow who has, with a high school education, gone into the plumbing or heating business from the necessity of earning his own living.

The honor of being the first to occupy the chair under the Theodore Ahrens' Professorship has been given to Professor S. E. Dibble, of the Carnegie Institute of Technology, who is also president of the American Society of Heating and Ventilating Engineers.

Rules for Burning Bituminous Egg and Nut Coals

Under the headings of "Preparation of Equipment for Any Kind of Coal" and "Management of Furnace for Bituminous (Soft) Coal," the Bertha-Consumers Co., of Pittsburgh, Pa., miners and shippers of bituminous coal, has issued a useful set of rules for burning bituminous egg and nut coals in heating stoves and furnaces.

In connection with the preparation of equipment, the rules read:

1. See that the grates are in good order.

2. Seal air leaks in ash pit and around clean-out doors, otherwise the dampers will not control the fire.

3. Cover steam and water pipes to prevent unnecessary radiation.

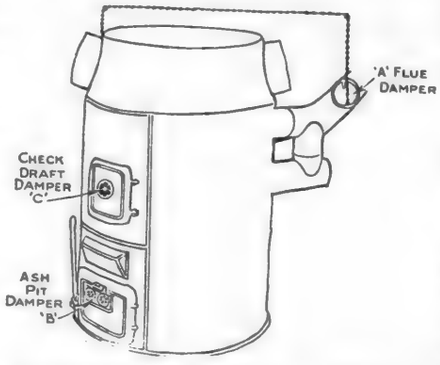
4. Provide suitable clean-out tools for boiler flues.

5. Prevent air leaks as far as possible by weather strips and storm windows.

6. Provide for recirculating air in warm-air furnaces by convenient slides in the pipes.

Rules for the management of the furnace when burning soft coal are:

No change in grates is needed to burn bituminous coal in furnaces heretofore using anthracite, except in the case of grates adapted to fine sizes of anthracite where the air passages are small and not easily cleaned.



Conventional Arrangement of Damper on House Heater

1. Keep heating surfaces clean.

2. Carry a medium fire (8 to 10 in.)

3. Do not let the fire burn too low.

4. For quick heat fire only a small amount of coal.

5. Study carefully the proper use of the three dampers. Usually it will be found that (a) the pipe or flue damper should be open when firing fresh coal and should be partly closed when the fire is well started; (b) the ash pit damper should be open to start up fire, open a little during the day, but shut at night; (c) the check draft damper should be shut to start up fire, open partly the day and night as experience shows to be necessary.

6. When fresh coal is fired, admit air over the fire through the slide in the fire door until smoking ceases, and then close the slide.

7. Do not open the fire door to check the fire; learn to use the dampers to control the rate of burning. All air admitted above the fire in excess of that needed for combustion simply cools the heating surfaces which furnish the heat for the house.

8. When firing coal for a long run, or banking for the night, use any fine coals for this purpose that may have accumulated. When banking, live fire should be evenly distributed over the entire grate surface; then apply the fresh coal, banking heaviest along the sides, resulting in a bowl shape formation.

9. Shake out the ashes when necessary, but do not waste coals into the ash pit. Close the ash pit door while shaking.

10. Do not let ashes pile up under the grates. In this way grates "burn out." Grates should last many years.

11. To save the heat made by burning coal, the following suggestions may appeal to some:

(a) Do not heat unused rooms; (b) let in sunshine; (c) pull down shades at night; (d) do not ventilate unnecessarily all night; (e) do not overheat the house—65° to 70° is sufficient for most people; (f) get a thermometer and watch the weather.

To avoid the soft coal dust the fuel should be well wet down before being put into the cellar and the front of the pile kept moist with an occasional bucket or two of water.

12. Throw bucket of water in ash pit every A. M. after cleaning out ashes.

Society of Liquid Fuel Industry in New York Disbands

The Society of Liquid Fuel Industry, organized about three years ago in New York City, has formally disbanded and its membership will probably be absorbed in the newly-organized New York Oil Burner Association. Formal action was taken at a luncheon given at the Town Hall Club, November 18, at which the members of the Society of Liquid Fuel Industry discussed the matter and by unanimous vote, declared the Society to be disbanded.

Among the guests at the lunchean was C. S. Winston, President of the New York Oil Burner Association, who briefly outlined the scope and proposed activities of this association. These activities probably will include a concerted effort to secure the modification of the existing rules fostered by the New York City Board of Standards and Appeals.

Deaths

Jesse C. Greenberg, for several years a traveling representative of the National Trade Extension Bureau, died recently at his home in Indianapolis, and was buried in Cleveland, his earlier home. Mr. Greenberg, in his extensive travels, appeared before many of the conventions and other meetings of the heating, ventilating and plumbing organizations, and had a wide circle of friends. In 1924 Mr. Greenberg became associated with the Sanitation Development League of Southern California, as educational director, but was recently forced to retire from active work, on account of failing health.

Among Those Present at the Fifth Annual T.E.B. Advertising and Sales Managers' Conference

T. E. B. Conference Yields Practical Suggestions for Boosting Business

MANY suggestions for expanding the business of the heating and plumbing contractors were brought out at the Fifth Annual T.E.B. Advertising and Sales Managers' Conference held in Evansville, Ind., November 10-12. Among those who addressed the conference were President John J. Vogelpohl, of the National Trade Extension Bureau; President Henry E. Longley, of the National Association of Master Plumbers and William G. Bergner, the new secretary-manager of the National Trade Extension Bureau.

Following an address of welcome by President Vogelpohl, the first paper of the conference was presented by Arthur G. Maier, a master plumber of St. Louis, on the "Establishment of Nation-Wide, Periodical Inspection Days for Master Plumbers and Heating Contractors." Mr. Maier emphasized the necessity of keener and more intense interest in the men who can be termed the retailers of these industries. As. Mr. Maier pointed out, the customer of the entire industry is the buying public, and it is from this source the orders come that create activity and business throughout for all.

CONTRACTORS HAVE THE MOST DIRECT CONTACT WITH THE BUYING PUBLIC

"Who is it?" he asked, "that comes in direct contact with this customer of the entire industry more so than anyone else?" None other, he declared, than the master plumber and the heating contractor.

Mr. Maier pleaded for more progressiveness in the management and appearance of plumbing and heating contractors' shops. As he pointed out, many agencies are at work on this particular problem, including the manufacturers, wholesalers, trade papers, National Trade Extension Bureau and many of the trade associations.

The outsider, the public, the manufacturer, the wholesalers, the progressive men within the industry, can see the weak features and bad service rendered by so many of the plumbing and heating concerns. The difficult problem that confronts us is to have the men who own these businesses recognize their own business shortcomings.

REGULAR, NATIONAL INSPECTION PERIODS PROPOSAL

As one solution of the problem, Mr. Maier suggested the establishment of regular national inspection periods in the plumbing and heating industries for all of its branches—the master plumber, the heating contractor, the wholesaler, and the manufacturer. This, he said, would certainly result in increased interest in correcting the business policies of those industries.

He proposed to set aside two periods of five days each, in every year, as inspection days.

"Sell the idea," he declared, "of inspecting and checking up on one's business and its business policies, also check up on the owner of the business. Once start these industries inspecting themselves, during two periods of the year, and you will create an interest that will result in daily checking up."

To carry out this plan, he proposed a committee of probably five, to work out the plans of procedure, to select the dates, give proper publicity to the same, and to enlist the co-operation of the various interests.

He pictured, as a result of such inspection, better service to the public, more and better sales made, and the plumbing and heating contractor developed into better salesmen and better business men. Also a better presentation of the plumbing and heating industries to the public, which means the establishment of better public relations.

INFLUENCE OF NINE BASIC ADVERTISING APPEALS

L. C. Bruch, of the American Radiator Company, then gave his report as chairman of the Exhibit and Show Window Research Committee. Mr. Bruch presented some interesting results of an investigation made by the Extension Division of the University of Iowa regarding the influence of nine basic advertising appeals for city women and for women living on the farm. Replies from farm

women as to what sales methods appeal to them, and set down in the order of their importance, were as follows:

1. Shopping from store to store.
2. Recommendations from friends.
3. Window displays.
4. Newspaper advertisements.
5. Recommendations of merchants.
6. Mail order catalogs.
7. Circulars sent through the mail.
8. Demonstrations.
9. National magazine advertisements.

Replies from women in cities were:

1. Window display.
2. Newspaper advertising.
3. Shopping from store to store.
4. Recommendations of friends.
5. Recommendations of merchants.
6. National magazine advertisements.
7. Demonstrations.
8. Circulars through the mail.
9. Mail order catalogs.

ENDORSES "EASY PAYMENT" PLAN

Approximately thirty-five miles of store window frontage are possessed by the heating and plumbing trades of the United States, which annually costs their owners a rental equivalent of over $6,000,000.

One of the principal suggestions of the committee was to display the fact that the products made by any and all of the manufacturers can be bought on *easy payments*. It was brought out that already there are 400 financial organizations available to handle this business in the various cities and towns of the United States.

"Perhaps the best single rule that this committee can offer," concluded the report, "is this: When merchandise is put in a window, the person putting it on exhibition should ask himself, 'What is it for, what will it do for the buyer?' When he has clearly determined this, he shall see to it that the answer is made clear and brief to the passer-by, to convert him into a 'passer-in,' either through display of other articles, properly associated with its use, or by display-card or illustration, or by all three of these aids."

In the discussion following the paper, it was brought out that in three years' time number of show windows had increased from 3000 to 8000.

PROGRESS OF MOVEMENT TO STANDARDIZE CATALOG SIZES

H. E. Hulseman, of the T. E. B. staff, gave an extensive talk on the work already accomplished and the further work planned in connection with the standardization of catalogs. Up to date, he stated, 462 manufacturers are cooperating and have advised the bureau that they would furnish catalog material in standardized size. This size is 7¾ x 10⅝ in. for bound catalogs, corresponding to 8½ x 10⅝ in. for loose-leaf or salesmen's catalogs.

Mr. Bergner opened the Wednesday morning session with a discussion of the matter of contractors refusing to sign orders for equipment from jobbers and manufacturers. The many mutual advantages resulting from the signing of orders were discussed and emphasized and it was planned to inaugurate an effort to establish this universally as regular practice.

One of the important addresses of the meeting was delivered by President Henry E. Longley, of the National Association of Master Plumbers on "The Position of the Master Plumber and the Heating Contractor in the Industry."

SEPARATE AND DISTINCT CHARACTER OF HEATING AND PLUMBING INDUSTRIES

Mr. Longley emphasized the separate and distinct character of these two lines. Comparing the contractor dealer with the shoe merchant, the clothier and that class of merchant, he brought out the unusual conditions under which contractors were obliged to do business, mentioning, particularly, the contrast between the quick returns of the merchant, and the extensive and numerous operations through which the heating and plumbing contractor must go, before fulfilling his contract.

He urged the jobber and wholesaler to give a more whole-hearted support to the master plumber and heating contractor, and avoid the direct selling to owners. He said this would have the effect not only of increasing the number of heating and plumbing concerns, but would also increase the volume and improve the service of those now constituting the industry.

The attention of the sales managers was aroused when Mr. Longley urged that salesmen might well spend a period of time in the shop of the contractors. This would result, Mr. Longley said, in a keener appreciation of the contractors' problems.

GOVERNMENT AID IN WIDENING HEATING AND PLUMBING MARKETS

A paper on "Federal Aid in Opening and Establishing Wider Markets in the Plumbing and Heating Industries" was presented by A. P. Eberlin, director of the statistical department of the National Trade Extension Bureau.

Mr. Eberlin showed how willing the various government officials are to aid in opening and establishing wider markets in these fields, especially in the way of making surveys of the heating market.

Howard E. Jones, of the Bureau, presented a paper on "Effective Co-operation Between T. E. B. and the Salesmen." Mr. Jones went at length into the operation of the Bureau, and showed many practical ways in which the services of the Bureau could be utilized to advantage by salesmen.

Another speaker at this session was C. B. Nash, of the Standard Sanitary Manufacturing Company, who spoke on special discounts for increasing retail displays.

"ASK 'EM TO BUY" CAMPAIGN SHOULD BE CONTINUED

In the report of the T. E. B. Sales Campaign Committee, James S. Malone, of the N. O. Nelson Manufacturing Company, urged the continuation of the use of the slogan—"Ask 'Em to Buy," and that all local trade meetings be addressed on the campaign and the proper interpretation of the slogan be made by manufacturers and sales executives at every opportunity.

In outlining the proposed program for the year, Mr. Malone stated that January would be devoted to Public Relations, urging the utilization of every means to improve shop appearances and the utilization of available means to create better public relations.

February, it is proposed to devote to activity in connection with the Bureau's National Apprenticeship Plan.

March will be taken up by the "Ask 'Em to Buy Radiator Heat" Campaign.

The tentative subjects for the other months are:

April: Kitchen sinks.
May: Water heaters and water supply systems.
June: Extra bath and showers.
July: Time payments.
August: Radiator heat.
September: More and better closets and septic tanks.
October: Heat regulation; asbestos coverings, etc.
November: Extra lavatories.
December: Better bathrooms.

R. C. Hay, manager of sales training for the American Radiator Company, spoke on "The Satisfactory Salesman in the Heating and Plumbing Industries."

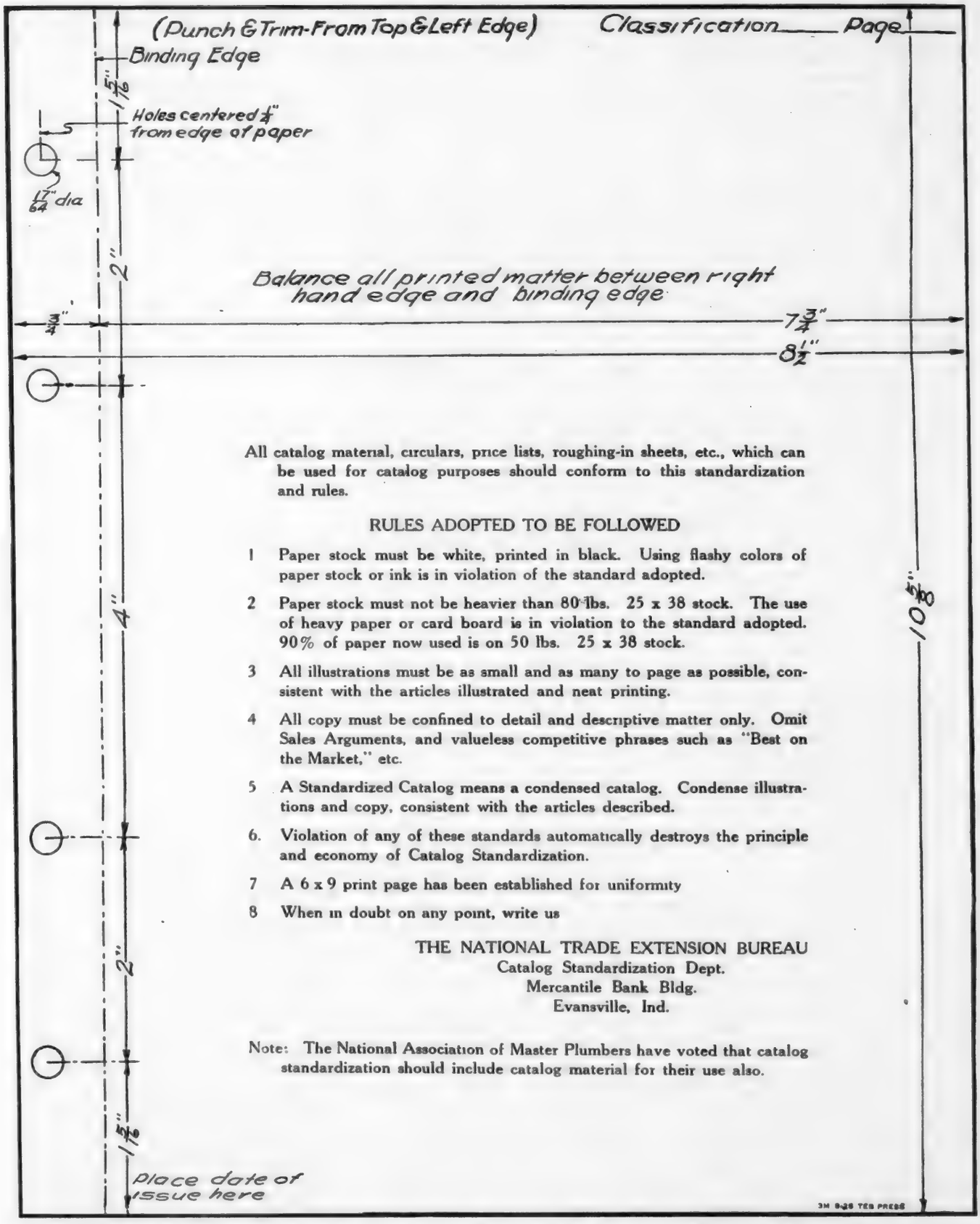
Mr. Hay advocated the thorough training of the salesmen, through a series of interviews, under different conditions, and at different places. This training, of course, should include an intensive study of the products, their manufacture and application, as well as association with a salesman in a given territory under actual working conditions.

"Persuading the Dealer to Operate a Real Selling Side for His Business" was discussed by C. W. Wanger, of the Woodward-Wanger Company.

"The Importance of the Trained Mechanic to the Industry's Success" was presented by E. L. Bowman, of the Bureau.

CONTINUING THE "ASK 'EM TO BUY" CAMPAIGN

A detailed outline of the Bureau's proposed activities for 1926 in continuing the "Ask 'Em to Buy" campaign was given in a paper by R. A. MacGill, of the



All catalog material, circulars, price lists, roughing-in sheets, etc., which can be used for catalog purposes should conform to this standardization and rules.

RULES ADOPTED TO BE FOLLOWED

1 Paper stock must be white, printed in black. Using flashy colors of paper stock or ink is in violation of the standard adopted.

2 Paper stock must not be heavier than 80 lbs. 25 x 38 stock. The use of heavy paper or card board is in violation to the standard adopted. 90% of paper now used is on 50 lbs. 25 x 38 stock.

3 All illustrations must be as small and as many to page as possible, consistent with the articles illustrated and neat printing.

4 All copy must be confined to detail and descriptive matter only. Omit Sales Arguments, and valueless competitive phrases such as "Best on the Market," etc.

5 A Standardized Catalog means a condensed catalog. Condense illustrations and copy, consistent with the articles described.

6. Violation of any of these standards automatically destroys the principle and economy of Catalog Standardization.

7 A 6 x 9 print page has been established for uniformity

8 When in doubt on any point, write us

THE NATIONAL TRADE EXTENSION BUREAU
Catalog Standardization Dept.
Mercantile Bank Bldg.
Evansville, Ind.

Note: The National Association of Master Plumbers have voted that catalog standardization should include catalog material for their use also.

Detailed Specification for Standard Catalogue Sheet of the Heating and Plumbing Industries

Crane Company. In addition to a preliminary campaign through December and January to secure the interest and co-operation of the manufacturers and wholesalers, the trade associations and the trade press, the activities will include the following:

Attractive two-color card, exploiting and explaining the "Ask 'Em to Buy" idea; mailed to every master plumber or heating contractor on the T. E. B. list.

Letters from T. E. B, (and all manufacturers and wholesalers who care to do the same) to the supply associations to give the "Ask 'Em to Buy" campaign a part and a place in the programs of their next meetings.

T. E. B. letter to Heating and Piping Contractors National Association and National Association of Master Plumbers to do the same as above with regard to their 1926 conventions.

The campaign to run up to the end of August, 1926, with the following activities to be observed each month; bearing upon the particular thing which is listed as to be featured in that month.

1. T. E. B. letter of suggestions to manufacturers, wholesalers and branches, enclosing material prepared by T. E. B. as a basis for a talk before local associations or groups by salesmen or other representatives.
2. T. E. B. letter to trade papers requesting publicity for the feature of that month.
3. T. E. B. letter to local associations or groups to arouse interest in the particular feature of the month.
4. T. E. B. letter each month to all T. E. B. men in the field, instructing them to feature at all of their meetings, the particular activity of this campaign for that particular month.
5. Article in T. E. B. Monthly Service Bulletin each month on that month's specific feature. Continuing of "Ask 'Em to Buy" script lines at bottom of Bulletin pages.

February—Feature: "Inspection Report Card" and chart "100 Things" as practical means of locating and indicating what to "Ask 'Em to Buy."

March—Feature booklet, "Compiling and Using a Mailing List Profitably", as a means for systematic carrying on of "Ask 'Em to Buy" efforts.

April—Feature: Sales-Letter Service of T. E. B. and similar special service of manufacturers, as an economical, flexible and effective method to "Ask 'Em to Buy."

May—Feature: Show Window and Sales-Room Display as the best kind of support for all other "Ask 'Em to Buy" efforts.

June—Feature: Personal Solicitation as the most effective of all methods to "Ask 'Em to Buy."

July—Feature: Telephone Canvass as an excellent additional method of locating prospects in order to "Ask 'Em to Buy."

August—Feature: Installment Plan Selling for domestic plumbing and heating installations. Material for this to include distribution of all circular matter of the Bureau on this subject, along with information of those companies who are seeking opportunity to finance this class of business for master plumbers or heating contractors.

"How the Salesman Can Successfully Help the Dealer to Sell" was the subject of an address by C. D. Brownell, a heating and plumbing contractor of Champaign, Ill. Mr. Brownell said the salesmen had a responsibility in the matter in lending encouragement to journeymen who want to enter business and to make sure that such journeymen are properly financed and capable in every way of remaining in business, when they do start.

A letter was read from President Frank A. Merrill of the Heating and Piping Contractors National Association, expressing his regret at not being present.

A resolution was adopted pledging the unqualified support and co-operation of the conference in making the administration of Mr. Bergner a success.

Mr. Bergner spoke on the topic, "Securing Better Understanding Throughout the Industries." He emphasized the need for a better understanding between the heating and plumbing industries and reviewed the vastness of each industry in importance, wealth and men.

The advantage of using the radio in national and local advertising to the public was brought out in a discussion by K. C. Gordon of the Wolff Manufacturing Company, of Chicago.

The conference was attended by some 70 manufacturers and manufacturer's representatives, while the staff of the National Trade Extension Bureau was represented by Secretary-Manager William G. Bergner, Howard E. Jones, director of the Sales-Help Service; Carl A. Bohrer, director of the Field and Lecture Service; E. L. Bowman, director of the Apprenticeship Service; H. E. Hulseman, director of the Catalog Standardization and Finance Service; and A. P. Eberlin, director of the Statistical Service.

Central Station Heating Rates 1925-1926

FOLLOWING the custom of recent years, the National District Heating Association has published, in its October *Bulletin*, the heating rates prevailing in district heating plants throughout the country. These rates are printed to serve as a guide in the industry and, in addition to the cost of steam, valuable supplementary information is in many instances added. Heating rates and information are given for the following cities:

Alexandria, Minn.
Albert Lea, Minn.
Anderson, Ind.
Auburn, N. Y.
Aurora, Ill.
Atlanta, Ga.
Atlantic City, N. J.
Aurora, Neb.
Adrian, Mich.
Baltimore, Md.
Bloomsburg, Pa.
Batesville, Ind.
Beaver Dam, Wis.
Benson, Minn.
Birmingham, Ala.
Bloomington, Ill.
Boulder, Colo.
Boston, Mass.
Butte, Mont.
Battle Creek, Mich.
Boone, Iowa.
Bristol, Conn.
Bismarck, N. Dak.
Coatesville, Pa.
Carroll, Iowa.
Canton, Ill.
Chicago, Ill.
Cleveland, Ohio.
Canton, Ohio.
Casper, Wyo.
Champaign, Ill.
Cheyenne, Wyo.
Clearfield, Pa.
Cedar Rapids, Iowa.
Canby, Minn.
Columbus, Ohio.
Detroit, Mich.
Davenport, Iowa.
Delaware, Ohio.
Duluth, Minn.
Dayton, Ohio.
Danville, Ill.
DeKalb and Sycamore, Ill.
Denver, Colo.
Eagle Grove, Iowa.
Elwood, Ind.
Erie, Pa.
Evansville, Ind.
Eveleth, Minn.
Evanston, Ill.
Fargo, N. Dak.
Fort Scott, Kans.
Faribault, Minn.
Forsyth, Mont.
Frankfort, Ind.
Fremont, Ohio.
Grand Forks, N. D.
Glendive, Mont.
Grinnell, Iowa.
Grand Rapids, Mich.
Harrisburg, Pa.
Hudson, Wis.
Hornell, N. Y.
Hillsboro, Ill.
Huntington, Ind.
Indianapolis, Ind.
Johnstown, Pa.
Kokomo, Ind.
Kansas City, Mo.
Little Rock, Ark.
Lockport, N. Y.
Louisville, Ky.
Logansport, Ind.
La Porte, Ind.
Lima, Ohio
La Crosse, Wis.
La Fayette, Ind.
Lincoln, Neb.
Lansing, Mich.
Manchester, Iowa.
Milwaukee, Wis.
Minot, N. Dak.
Marion, Iowa.
Mexico, Mo.
Missoula, Mont.
New Philadelphia, Ohio.
New Castle, Ind.
Noblesville, Ind.
New York City, N. Y.
Oak Park, Ill.
Oskaloosa, Iowa.
Ottuma, Iowa.
Overbrook, Pa.
Paducah, Ky.
Pittsfield, Mass.
Peru, Ind.
Penn Yan, N. Y.
Perry, Iowa.
Pontiac, Ill.
Peoria, Ill.
Pittsburgh, Pa.
Portland, Ore.
Pekin, Ill.
Phillipsburg, Pa.
Pottsville, Pa.
Quincy, Ill.
Red Oak, Iowa.
Rochester, Ind.
Rockford, Ill.
Rochester, N. Y.
Reading, Pa.
Renovo, Pa.
Sioux City, Iowa.
South Bend, Ind.
Springfield, Ohio.
St. Joseph, Mo.
San Diego, Cal.
St. Louis, Mo.
St. Paul, Minn.
Streeter, Ill.
South St. Paul, Minn.
San Francisco, Cal.
Spokane, Wash.
Springfield, Mo.
Scranton, Pa.
Saginaw, Mich.
Springfield, Ill.
Salt Lake City, Utah
Seattle, Wash.
Toledo, Ohio.
Tacoma, Wash.
Towanda, Pa.
Terre Haute, Ind.
Virginia, Minn.
Waukegan, Ill.
Wilkes-Barre, Pa.
West Chester, Pa.
Wadena, Minn.
Windber, Pa.
Worcester, Mass.
Winnipeg, Canada.
York, Pa.
Youngstown, Ohio.

New Apparatus and Appliances

A.B.C. Direct-Fired Heaters

Designed especially for installation in garages, foundries, warehouses, and small manufacturing plants, a direct-fired unit heater, has been placed upon the market by the American Blower Company, Detroit, Mich. These units are essentially warm-air pipeless furnaces with a motor-driven fan built into the warm-air circulation system at the point of entry into the furnace jacket. Above the single-pipe outlet, is a deflector plate for diffusing the warm-air blast. The units are at present built in three sizes, having rated capacities of from 200,000 B.T.U. per hour to 400,000 B.T.U. per hour.

Venturi-type disc fans are used with the two smaller sizes, and the Sirocco blower with the largest size. A.B.C. units are direct coal-fired, and may be placed in any position in a large room and used with the deflector, or they may be piped in conventional fashion to rooms overhead. They may also be used as a ventilating system, the fan being connected to outdoors or air can be recirculated, directly from the room. The heater works on the pressure rather than the suction principle, the result being that products of combustion cannot enter the air chamber because of the excess pressure there maintained by the fan. This arrangement also makes possible the use of a forced draft, by opening a damper into the ash pit. During the night period the unit functions by gravity, with sufficient output to take care of the night heating. This is accomplished by means of unbalanced dampers which automatically close when the fan is in operation, and automatically open when the fan stops.

A.B.C. Direct-Fired Unit with Venturi Type Disc Fan

Large Size A.B.C. Unit With Sirocco Fan

Particular attention is drawn to the fact that this unit does not consist of an ordinary warm-air furnace, but of an especially designed furnace, having large radiation surface to take advantage of the forced circulation. It is interesting to note that an efficiency of over 65% is claimed for these units.

Stackulation—A New Method of Draft Control

There is a general recognition of the fact that *quantitative* control of draft is essential to the efficient operation of furnace and boiler units of heating or power systems. But *uniformity* in draft control and its significance in respect to fuel consumption is not so widely appreciated. Low-pressure plants in the domestic and apartment house field have been neglected almost entirely in the development of draft control. Only in the past few years has any particular progress been made in this direction and simple, inexpensive apparatus developed designed to give equal satisfaction on either high or low-pressure systems.

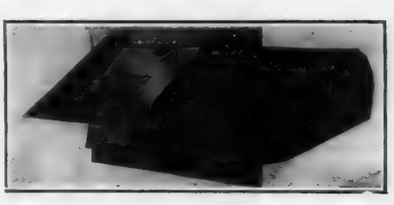
A method known as Stackulation has been designed as an effective means of securing uniform draft control by an *air-cushion* action. The Stackulator consists of a steel or cast-iron frame and door, which are installed in the chimney wall below the flue pipe. A metal sleeve, with two deflectors at the inner end, leads from the frame to the interior of the chimney. The size of the door opening is determined by the height, diameter and gas volume of the chimney. Reference to the accompanying diagram will show the action which takes place.

As described by L. S. Pearson, president of the Inter-Ocean Products Company, air is admitted to the chimney through the Stackulator; the two deflectors direct the air toward the bottom of the chimney and break its force. As the hot flue gases rise in the chimney, they cause a similar action on the part of the air admitted through the Stackulator. This sets up a resistance at the flue opening, caused by the two currents of air and gas meeting at that point.

The result is a retarding of the flue gas velocity, which extends back into the boiler or furnace, where there occurs a spreading out or diffusion of these gases.

This diffusion of the hot gases permits a slightly longer contact with the heat-absorbing surfaces and tends to eliminate dead gas pockets, particularly at points where there is a change in the direction of gas flow. The action is manifested by a reduction in the temperature of the flue gases and chimney, a simple demonstration that less heat is being wasted; further, the fire takes on a different aspect, the flames being somewhat shortened in the case of domestic furnaces and more arched in the case of horizontal boilers.

The general results of this action are: a more uniform fire, greater intervals between firing periods and a greater amount of heat actually utilized from any given quantity of fuel or, conversely, equal heat from less fuel. Incidentally, there is a diminution of smoke, due partly to slightly better combustion and partly to dilution in the chimney with the air admitted through the Stackulator. A secondary action is also noticeable—ventilation of the boiler room.

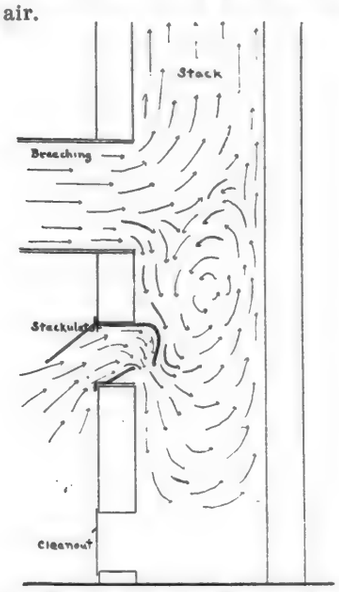


Stackulator Unit.

Stackulation, it is pointed out, is to be considered an adjunct to the damper and not a substitute. Proper installation is emphasized, as well as the use of the correct size. The attachment, it is stated, must be installed at the right distance beneath the flue or breeching and there must be what is called sufficient "banking space" between the Stackulator and the bottom of the chimney in which to produce the rolling, whirling, tumbling air-cushion effect.

This air motion, it is stated, can be observed readily by throwing a lighted paper into the Stackulator where it is seen to be hurled to the bottom of the chimney. There it remains while burning, the sparks rising from it with the motion already mentioned.

Furthermore, unless the upper deflector is set at the correct angle to the chimney diameter, the only effect is to reduce the draft and kill the fire. But with the deflector at the correct angle, the hot flue gases can be felt beyond the tip of the upper deflector as they are pulley down and mixed with the inflowing air.



Air Cushion Action Produced by Stackulator

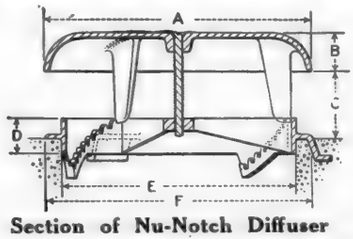
It is this whirling air cushion, states Mr. Pearson, which fundamentally distinguishes "Stackulation" from the very drastic action produced by opening the cleanout door in the chimney.

Notable economies are reported with the device. While it has had its main development in the Middle West where bituminous coal predominates in domestic low-pressure plants, successful installations are reported in plants in the East using anthracite coal and fuel-oil.

The device is manufactured by the Inter-Ocean Products Co., 155 East Superior Street Chicago.

Improved Model of Nu-Notch Mushroom Air Diffuser

An improved mushroom air diffuser has been placed on the market by Knowles Mushroom Ventilator Co., New York, embodying a clever method of providing for various degrees of opening. The construction is such that when the mushroom is once fixed it cannot be disturbed, nor can the top be moved by any amount of service punishment to which it may be subjected. There are only two elements, a floor plate and a cap. The floor plate may be set on wood, or anchored in a concrete floor. Spaced equally around the inside face of the floor cap are three series of notched steps.



Section of Nu-Notch Diffuser

The cap consists of a mushroom cover with three legs, the lower ends of which fit into the notches on these steps. From the center of the cap a screw extends downward into a nut held by three arms from the floor plate, the top of the screw being recessed in the cover. The cap may be set into the floor plate with the legs in any of the notches, and when the central screw is tightened, the cap is held on the tripod legs in a fixed position from which it is impossible to dislodge it.

There are ten notches, giving a wide range of adjustment. A raised collar on the floor piece prevents dirt or water from entering the air duct.

There are no restrictions to the air delivery, as the notches are cast on the inside of the floor collar. When the legs rest in the top notch, the ventilator area is the same as the full area of the connecting sleeve. The Nu-Notch air diffuser is made in six sizes, from 4 in. to 10 in. diameter.

Honeywell Type-D Damper Control Motor Provides Duplex Control

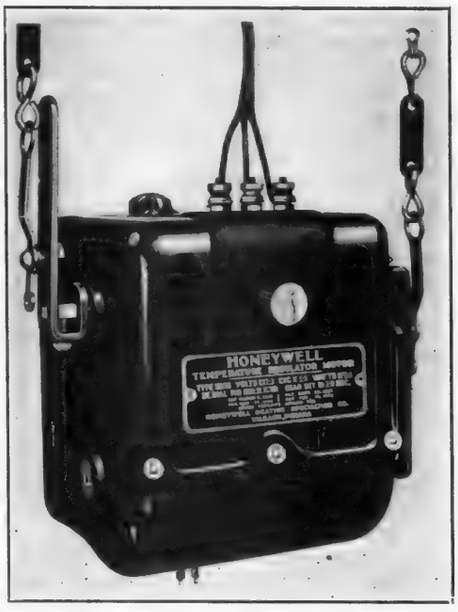
Type-D temperature regulator motor has been announced by the Honeywell Heating Specialties Co., Wabash, Ind. This control motor is designed to function through a room thermostat, and either a vaporstat or aquastat in the boiler, its application extending to boilers fired with coal, oil or gas. This new control is particularly interesting on account of the number of conventional parts that have been eliminated, and illustrates the extraordinary degree to which temperature-control equipment has been developed in the last two or three years.

The Type-D damper control motor has no armature windings, commutator, brushes, or brush holders. This design has eliminated all possible trouble from short-circuited windings, dead commutator bars and dirty commutator or brushes.

Another interesting feature is the elimination of danger from overoiling, yet sufficient oiling capacity is provided to last for ten years under normal conditions. The operation of this control motor is as simple as its construction.

Alternating current at 110 volts is taken into the motor, energizing the field and causing the rotation of the rotor. The line voltage is also reduced to low voltage for the thermostat circuit. This low voltage is carried to the room thermostat and to the boiler-control elements. Sufficient torque is developed by this motor to handle the heaviest damper that may be found in conventional practice.

The vaporstat and aquastat developed by the Honeywell Company, are designed to limit the boiler pressure or temperature to any desired point. With such an installation, the room temperature is maintained at a given point, and at the same time the boiler is protected from an over-demand that might be the result of a door or window left open in the control room. If the room thermostat still calls for more heat after maximum pressure or water temperature has been reached the vaporstat or aquastat, independently, causes the control motor to close the dampers. With the reduction of boiler pressure or temperature, the control is returned to the room thermostat. The new type-D temperature regulator motor is listed as standard by the Underwriters Laboratories.



Honeywell Damper Control Motor

The Honeywell Company also announces that after January 1, there will be available a new Type-R 20-day thermostat, which will equipped with a jeweled balance clock, designed to require winding but twice a month. This clock is furnished with a program device, whereby the temperature may be reduced during the night to any desired extent. An interesting feature is the day and night indicator, which shows the position of the day and night regulating cams at a glance. These new temperature control devices are fully illustrated and described in literature just issued by the Honeywell Heating Specialties Company.

A Ventilator for Gallery Risers

An addition to the products manufactured by the Knowles Mushroom Ventilator Co., New York, consists of an adjustable gallery riser ventilator used for the intake or exhaust of warm or cool air in theatres, churches or school auditoriums. These units are made in sizes 6, 8, 10 and 12, and have areas equal to conventional Mushroom ventilators of corresponding diameter.

Present Accepted Practice in Domestic Oil Burners

13. Electrol. *Atomizing Mechanical Draft. Pump Feed of Oil from Storage Tank Direct to Nozzle. Atomizing by Pressure Through Nozzle in Venturi.*

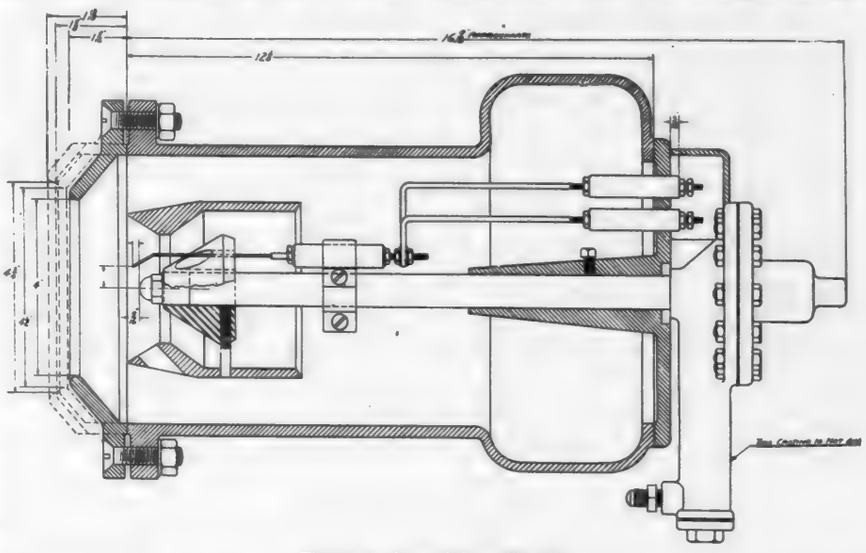
Previous articles in this series are: July, 1925,—1. Kleen Heet, 2. Baker, 3. Kerrihard; August, 1925,—4. Silent Glow, 5. Aetna; September, 1925,—6. Caloroil, 7. Oil-O-Matic; October, 1925,—8. Chalmers, 9. Hart, 10, Sun. November, 1925,—11. Rayfield, 12. A.B.C.

13 - Electrol

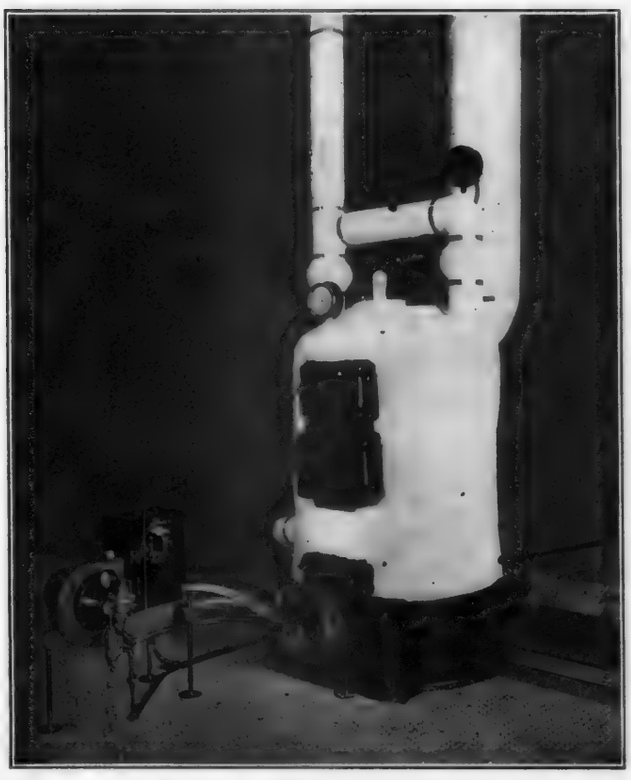
THE Electrol automatic oil burner, of the mechanical draft atomizing type, is manufactured by the Home Appliance Corporation, St. Louis. It is built up around an atomizing nozzle, a Sirocco fan, an oil pump, an electric ignition system and an interlocking control. There is only one motor in the unit, a 1/10 H.P. size, with the fan mounted direct on the motor shaft. The low speed of the motor, rated at 1750 R.P.M., and the arrangement of the fan make for quiet running and freedom from trouble.

Oil is taken directly from the storage tank by the burner pump, which has a lift ability of 11 ft. The pump has a capacity greatly in excess of possible burner requirements, and the surplus is by-passed and returned to the tank. The oil-feed control is simple, yet positive. There are two pressure-regulating devices, the first of which is in the fuel line, taking the oil from the pump. The second, a diaphragm-operated valve is seated in the rear of the oil nozzle.

The capacity of the burner is determined by the size of the nozzle orifice, which, in turn, predicates the pressure that should be applied to the oil to produce complete atomization. For a given installation, the size of the nozzle being taken to correspond to the connected radiation, the diaphragm on the nozzle valve is set at 10 lbs. less than the correct pressure for that nozzle. The other valve is then set to the proper pressure by means of a pressure gage mounted on the valve. Under these conditions, when the burner is started, pressure builds up back of the nozzle, but oil will not be admitted until the proper atomizing pressure has been reached. With the opening of the first valve, the other, of course, opens. When the burner is stopped the nozzle valve closes almost instantly, preventing any dribbling from the nozzle.



Electrol Atomizing Nozzle



A Typical Electrol Installation

OFF-SET BURNER UNIT MAKES FOR EASY INSPECTION

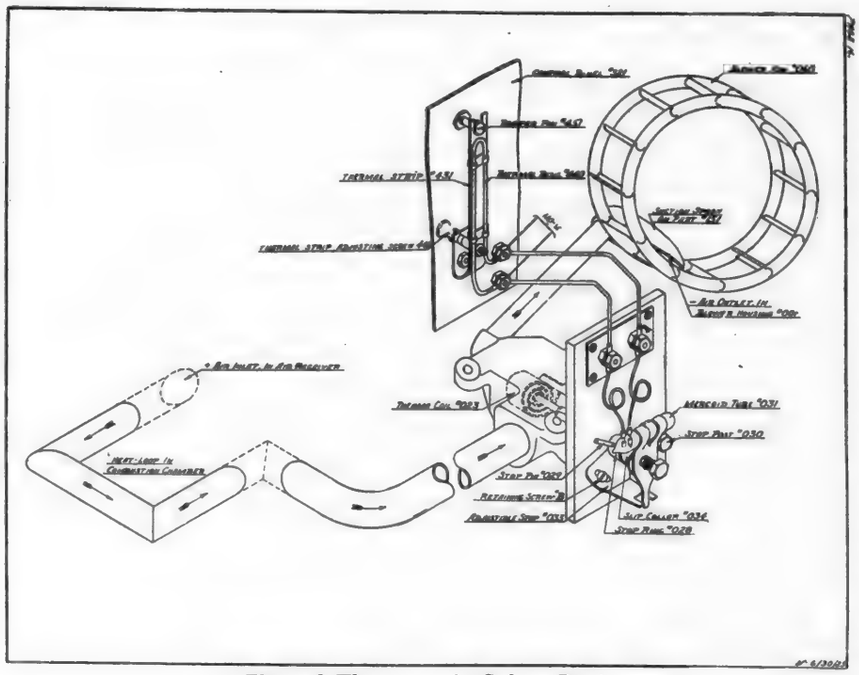
The burner assembly of pump, fan and regulator is mounted on adjustable legs, and set in front of, and at one side of the ash-pit door, the nozzle assembly being inserted in the ash-door, with its tip projecting slightly inside of the lining. The connection to the motor unit is made through a rigid section of blast pipe, in an arc of 90°, the object of the off-set being to keep the burner out of the way of any one using the furnace doors for installation or inspection.

The quarter-circle of blast pipe carries only air, the nozzle being located at the outlet end of the straight section of the blast tube projecting into the combustion chamber.

The nozzle is of the stationary type, so constructed as to form a Venturi in the air-blast tube. Immediately in front of the nozzle, and so set as to be just beyond the limits of the jet of atomized oil are two electrodes, connected to a high potential transformer. When the burner is in operation an arc is formed between these terminals, igniting the jet of oil mist; the continued functioning of the arc insures ignition whenever oil is being atomized.

SIMPLE THERMOSTATIC SAFETY DEVICE

A clever safety device has been developed, based on a thermostat element located on the burner unit, enclosed in a casing. Air from the furnace room, through the action of the Sirocco blower fan, is sucked through a pipe that is arched around the nozzle so that it is heated by radiant heat from the flame when the burner is in operation. This air, heated in its passage through this section of the pipe is drawn through the thermostat casing, and on to the blower. The thermostat element is so adjusted that, unless the air is heated to a predetermined amount 40 seconds after the burner motor has been started, it



Electrol Thermostatic Safety Device

will operate to interrupt the main circuit of the burner. In this event the safety must be reset by hand. It is thus evident that failure of the burner to function properly will result in cold air being passed to the thermostat, and the safety will operate.

Different rates of combustion are secured through the use of four atomizing nozzles of varying aperature, and the burner becomes adaptable to the house of three rooms as well as to the largest residence or apartment house.

Minneapolis model 55-10 thermostatic control is furnished as standard with the model T Electrol.

The model T Electrol is listed as standard by the Underwriters Laboratories, when burning fuel lighter than 32° A.P.I.

Heating and Ventilation to be Prominently Featured at New York's "Own-Your-Home" Show

House heating and fuel supply is of such vital interest to the home owner and prospective builder to-day, that the Eighth Annual "Own Your Home" Building and Equipment Exposition, to be held in the new Madison Square Garden next February, is featuring this division in one of the most complete displays ever assembled.

A. A. Adler, president of the New York Chapter of the American Society of Heating and Ventilating Engineers, is chairman of the exposition's Committee on Heating and Ventilating. Following are the members of Mr. Adler's committee: J. B. Garfield, of the American Radiator Co.; H. W. Porter, of Johns-Manville, Inc.; J. K. Peacock, of the Hoffman Specialty Co.; C. M. Lyman, of the International Heater Co.; E. G. Rhoads, of the Kleen-Heet Atlantic Distributing Co.; G. M. Scott, William J. Olvany, G. C. Schmidt, P. E. Fansler, of THE HEATING AND VENTILATING MAGAZINE; R. H. Bradley, of the Kelsey Heating Co.; Wallace Goodnow, of Pierce, Butler & Pierce Mfg. Corp.; L. Kennedy, of the American Blower Co.; and W. H. Wilson, of the Minneapolis Heat Regulator Co.

The classification of the Heating and Ventilating Section, which was developed by the New York and Chicago Chapters and edited by the American Society of Heating and Ventilating Engineers, is as follows:

Boilers—Steam; Water.
Warm-Air Furnaces—Pipe; Pipeless.
Heating Systems — One-pipe Steam; Two-pipe Steam; Two-pipe Vapor; Gravity Water; Piped Warm-air; Pipeless Warm-air.
Radiators.
Fuels—Coal; Gas; Oil.
Appliances and Accessories — Automatic Heat Regulator; Air Valves; Modulating Valves; Return Line Traps; Insulating Material; Metal Reflectors and Registers; Ash Receivers; Automatic Stoker; Oil Burners.
Ventilation—Kitchen Exhaust Fans; Force Draft Fans; Force Circulating Fans; Roof Ventilators; Automatic Humidifiers.

The relative merits of coal, gas, and oil burning equipment will be set forth, and the importance of the proper construction and insulation of a home will be shown by the saving in fuel consumption. Comparative charts will show the units derived from various qualities of fuel used to heat a given number of rooms in a home properly insulated, as against the same rooms lacking this protection, and how the additional cost of insulating the walls, floor and roof of a house will be paid for in a very short time by the saving in fuel.

The Armstrong Cork & Insulation Company will exhibit a cross-section of a house showing just exactly what is meant by insulation, how it is applied, and the reason for the fuel saving and the home comfort which it produces. Wood conversion and other types of insulation will also be shown.

The American Gas Association is planning a model basement layout for gas heating, and the Consolidated Gas Company will show a new type of gas boiler for domestic heating.

A group of oil burners, all of which have been approved by the New York City Board of Standards and Appeals, will show under actual service conditions, for the first time in New York City, the advance of oil-burning equipment for house heating. The coal-burning group is well represented, as usual, with various types of warm-air, steam, and hot water equipment.

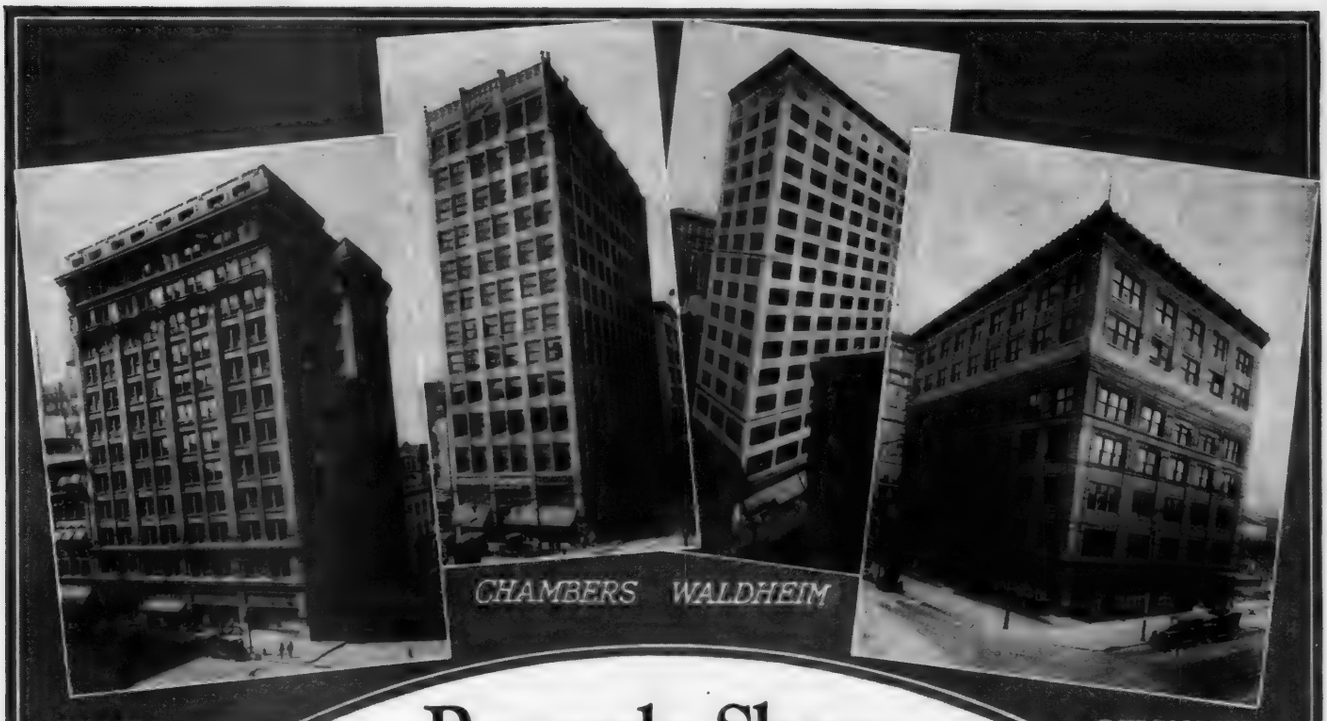
Another feature which will be brought out will be that of improving an old home, to show how the installation of a modern heating system will add to the comfort of the family, and to the value of the property.

THE DUNHAM HAND BOOK, No. 314, has recently been issued by the C. A. Dunham Co., Chicago, It is presented in a small pocket form with nearly 200 pages, and contains, in addition to descriptions of the products manufactured by the Dunham Company, a very comprehensive collection of engineering data and information of interest to heating engineers. As a matter of fact, while referece is naturally directed to the Dunham system, the volume is an excellent hand book of heating engineering. In addition to the old established line of Dunham products, the catalogue also includes complete specifications and descriptions of the Young centrifugal vacuum and boiler-feed pump, the Young Company having been recently acquired by the C. A. Dunham Company. Copies of this hand book will be mailed upon application. Size 4 x 6½ in. Pp. 190.

HERBERT BOILER CO., Chicago, announces that Peter M. Smith, formerly of the Newport Boiler Company, has become identified with its Chicago office.

MONARCH METAL PRODUCTS CO., St. Louis, has appointed Charles G. Buder to be assistant sales manager.

ILLINOIS ENGINEERING CO., Chicago, has opened an office in Grand Rapids, Mich., in charge of Harvey N. Miller.



Records Show 48% Saving of Steam

Books of the Kansas City District Heating Company reveal true value of Automatic Temperature Control

When Keene & Simpson, Architects, were preparing plans for the heating of the Land Bank Building at Kansas City, they commissioned Walter E. Gillham, Consulting Engineer, of that city, to secure facts and figures on which to base their specifications.

Mr. Gillham obtained records from the books of the public utility plant, which supplies heat for many of Kansas City's buildings. Records of the four office buildings shown above revealed that the following number of pounds of steam were required, per thousand cu. feet of space.

Chambers Building, with Temperature Regulation, 3840 lbs.

Reliance Building, without Temperature Regulation, 7200 lbs.

Rialto Building, with Temperature Regulation, 3500 lbs.

Waldheim Building, without Temperature Regulation, 6728 lbs.

In dollars and cents—the cost per thousand cu. feet in the Chambers Building, equipped with Powers Control, was $5.95, and of the Reliance Building $8.82, or 48% more.

The secret of the accuracy, dependability, and long life of the Powers System of Temperature Regulation lies in the "vapor disc" thermostat. They do not need to be "SERVICED" every year for they often give 15 to 20 years of accurate control without repairs or adjustments.

Powers Thermostats use only 10 per cent of the air required by others—that is why they last so long, without repairs.

Wherever accurate records can be obtained it is always found that Automatic Control of temperature results in fuel economy. The unfailing regularity with which this fact develops, from records of Powers installations, convinces any inquirer that the Powers control is not an expense, but a highly profitable investment.

Our Engineers, located in 35 principal cities, will gladly help you to select the type of temperature control best suited to give the results you want. All the facts, figures and experience gathered in our many years of experience are at your command.

THE POWERS REGULATOR COMPANY

35 years of specialization in temperature control

2718 Greenview Avenue, Chicago

Atlanta	Cincinnati	Indianapolis	New York	Canadian Offices
Baltimore	Cleveland	Kansas City	Philadelphia	Toronto — Winnipeg
Boston	Denver	Los Angeles	Pittsburgh	Montreal — Calgary
Buffalo	Des Moines	Milwaukee	Rochester	Halifax — Vancouver
Butte, Mont.	Detroit	Minneapolis	St. Louis	
Charlotte, N. C.	El Paso	Nashville	San Francisco	
Chattanooga	Houston	New Orleans	Seattle	

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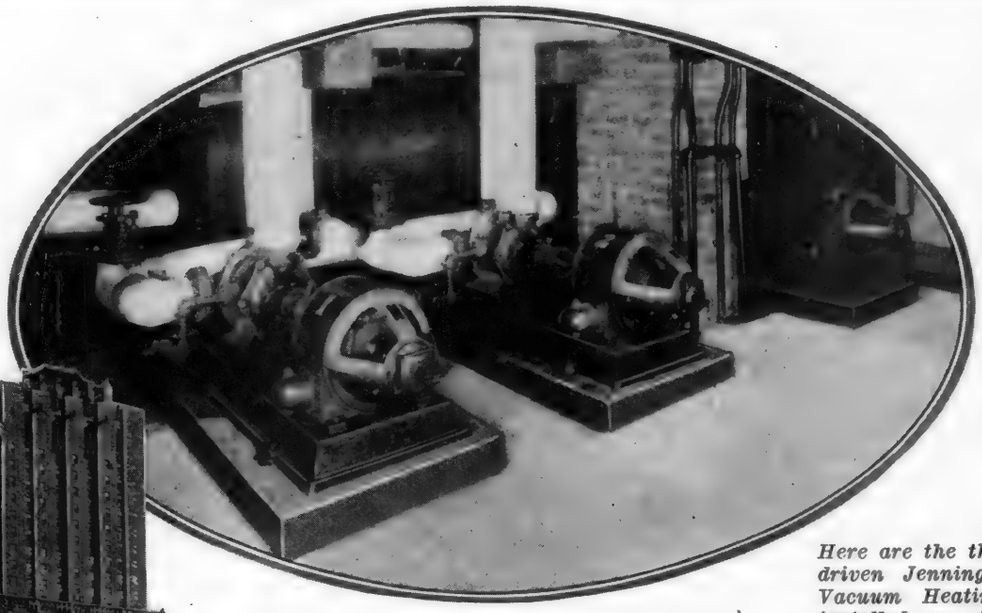
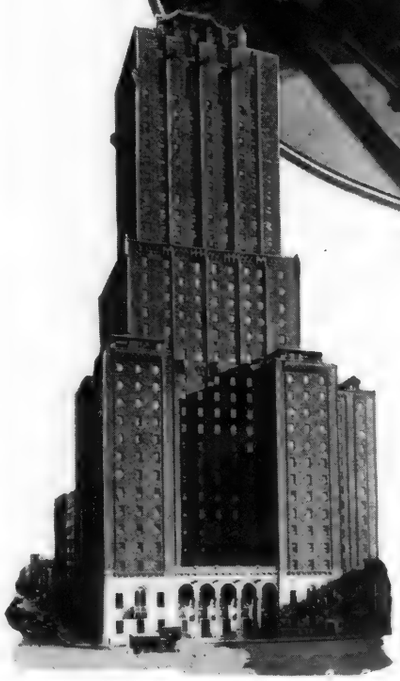


Here are the three motor-driven Jennings Hytor Vacuum Heating Pumps, installed on the return line heating system of the Shelton Hotel, New York.



Shelton Hotel, Lexington Ave. and 49th St., New York, N. Y. Mr. Arthur Loomis Harmon, Architect; Jaros and Baum, Consulting Engineers; Gillis and Geohegan, Heating Contractors; Shelton Holding Corporation Owners.

Hytors serve the Shelton, also

Three-motor driven Jennings Hytor Vacuum Pumps are depended on for removing the condensation and air from the return line heating system of the Shelton Hotel, New York, N. Y., —two units each capable of handling 65,000 sq. ft. equivalent direct radiation, and a third suitable for 40,000 sq. ft.

In a building of this character, good heating is a requisite of first importance. Only the most efficient design, and equipment will assure the results that are expected and demanded,—and the fact that Hytors were specified for this installation is a significant recognition of their excellence.

Jennings Hytors deserve this commendation. In the many years they have been in use, they have conclusively proved again and again that they give reliable service season after season, with the characteristic dependability that distinguishes superior equipment.

Be sure to visit the Nash Booth No. 66, at the Power Show, Grand Central Palace, New York, November 30th to December 5th, 1925. Jennings Hytor Vacuum Heating, Condensation and House Service Pumps will be on exhibition, as well as a No. 8 Nash Hytor Vacuum Pump and a Jennings Hytor Sewage Ejector. Our engineers will be on hand to discuss the several applications of our equipment under any given operating conditions.

NASH ENGINEERING COMPANY

So. Norwalk **Connecticut**

Write for these Bulletins. They completely describe the several Jennings Heating Pumps,—their construction, method of operation and the superior service they always give in the uses for which they are recommended.

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Jennings Hytor

RETURN LINE AND AIR LINE VACUUM PUMPS CONDENSATION AND CIRCULATING PUMPS

Trade and Miscellaneous Notes

Coming Events

January 27-29, 1926.—Annual meeting of the American Society of Heating and Ventilating Engineers, in Buffalo, N. Y. Headquarters at the new Hotel Statler.

January 27-29, 1926.—Annual meeting of the Engineering Institute of Canada, in Toronto, Ont.

October Building Volume Largest on Record

Last Ten Months' Total Exceeds 1924 Record

The total of building construction for 1924 has already been exceeded in the first ten months of 1925, according to the last report issued by F. W. Dodge Corporation. Building and engineering contracts awarded in October, in the 36 eastern States, amounted to nearly $520,000,000. This was 27% greater than the volume for October, 1924. Of the total construction, 51% was for residential buildings; 13% for public works and utilities; 12% for industrial buildings; 11% for commercial buildings; and 5% for educational buildings.

It goes without saying, that 1925 will be the record year to date, inasmuch as 1924, which had figured as the greatest building year, has already been exceeded. In the past ten months the total construction started has amounted to nearly $5,000,000,000, practically $400,000,000 in excess of the construction for 1924. This figure exceeds the construction total for the first ten months of 1924 by 28%.

In the New England territory building and engineering contracts amounted to nearly $39,000,000, an increase of 24% over October, 1924. For the ten months of this year, there was an increase of 36% over the corresponding period of last year.

In New York State and northern New Jersey, there was a 31% increase over October, 1924, and a 10% increase over the corresponding period of last year. In the Middle Atlantic States there was a decrease of 13% from October of 1924, but the total is 15% increase over the building volume for the first ten months of last year, and practically equals last year's total volume.

In the Central West, although there was a decrease of 21% from September, the increase over October of last year was 35%, and the volume of new construction started during the past ten months has amounted to a billion and a quarter dollars; this enormous volume being 43% greater than the corresponding period of 1924 and 20% greater than the entire 1924 volume. Contemplated new work for the district shows an increase of 31% over the same period of last year.

There was a decrease in building in Minnesota, the Dakotas and northern Michigan, both compared with September, 1925, and October, 1924. However, the total construction started in this area, during the past ten months, shows nearly 10% increase over the corresponding period of last year.

Personal

H. B. Kimbrough, district manager of the American District Steam Co., Chicago, Ill., has just returned from a vacation in France. In commenting upon the industrial situation in France, Mr. Kimbrough says that the red tape involved in securing permits for construction is such that it requires from

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The Autovent Propeller Fan with patented motor cooling features.

Uniblade Blowers have the same sturdy, careful construction as all Autovent Units. Ask about them!

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twelve to eighteen months to get action from these boards, with the result that construction work is everywhere slowed up.

William Allen Shoudy, consulting engineer, has become associated with David Moffat Myers in consulting work in the industrial power plant field, with offices at 1 Madison Ave., New York. Mr. Shoudy has had an extensive experience in large power-plant design and operation, particularly in connection with the steam station at Muscle Shoals. He has also had experience in the combustion field, in which he is well known as an authority.

Charles F. Hauss, Far Eastern representative of the American Radiator Company, who has been on a trip to the United States, sailed on the Homeric on his return trip, October 17. He will proceed first to Italy, where he will join his wife and two-year old grandson. Mr. Hauss was in Japan at the time of the earthquake and had a thrilling experience. He also has figured in the recent troubles in China where he reports affairs to be greatly unsettled, due to the civil wars in that country.

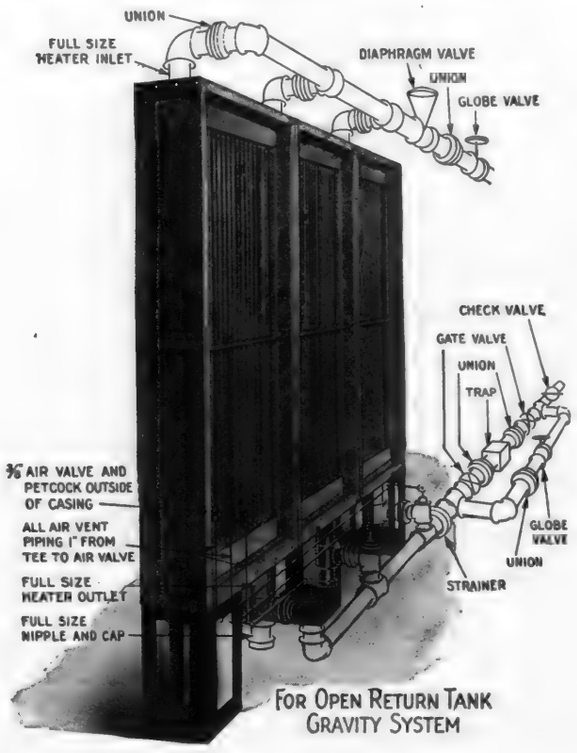
Miscellaneous Notes

National Public Health Association has elected C. E. A. Winslow, president for 1925-1926. Dr. Winslow has been chairman of the committee on Municipal Health Department Practice since 1920. As a result of the work of this committee a section of the association has been placed at the service of city health officers, and this service will soon be extended to county health officers. Dr. Winslow has participated in meetings of the American Society of Heating and Ventilating Engineers, and was a member of the New York State Commission on Heating and Ventilation.

Superheater Co., New York, manufacturer of boilers and heaters, has put into effect a group insurance program for the benefit of employees in New York, Boston, Chicago, Pittsburgh and Montreal. Approximately 200 employees representing 95% of those eligible to participate, have subscribed to the plan, which was arranged on an equitable cost basis through the joint payment of premiums by employer and employees. The coverage totals about $300,000. G. L. Bourne, president of the company, F. A. Schaff, vice-president, and M. Schiller, treasurer, were principally responsible for the adoption of the group plan which offers life insurance protection, ranging from $1,000 to $3,500, to each eligible employee, and health and non-occupational accident protection carrying an individual weekly benefit of $10 in case of sickness or injury. Coverage for department heads and executives was arranged on a different basis.

Included in the life insurance contract is a total and permanent disability clause which guarantees, to any employee becoming totally and permanently disabled before age 60, the full amount of his insurance in monthly installments for a stipulated period. During the total disability period premiums are waived by the insurance company. The insurance was negotiated by the Metropolitan Life Insurance Company.

Philadelphia Building Congress awarded building certificates of craftmanship, at its annual fall meeting, to a number of individuals and firms who have shown special skill in developing the artistry or handicraft possibilities in their particular field of work. The meeting was presided over by D. Knickerbacker Boyd, president of the congress, and addresses were made by a number of prominent architects, builders and representatives of clubs and industrial associations in Philadelphia. The purpose of issuing these certificates is to encourage and preserve, in Philadelphia, the true spirit of craftmanship; to give recognition to those whose skill, patience and toil have been outstanding. The certificates were awarded on the recommendations of the committee on awards, and it is interesting to note that the popular vote cast by visitors at the recent exhibition of architecture and allied arts, practically coincided with the recommendations of the committee.



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To Engineers, Architects and Contractors

THREE YEARS OF SUCCESSFUL SERVICE demonstrates that AEROFIN has established itself as a dependable product.

ENGINEERS OF NATIONAL REPUTATION AND TWENTY YEARS' EXPERIENCE WITH FAN SYSTEM HEATERS, are responsible for the design, development, manufacture and marketing of AEROFIN, and their services are at your command to assist you in working out your heating, ventilating, cooling and drying problems.

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AEROFIN IS MADE OF NON-CORROSIVE METALS. This feature meets with universal approval.

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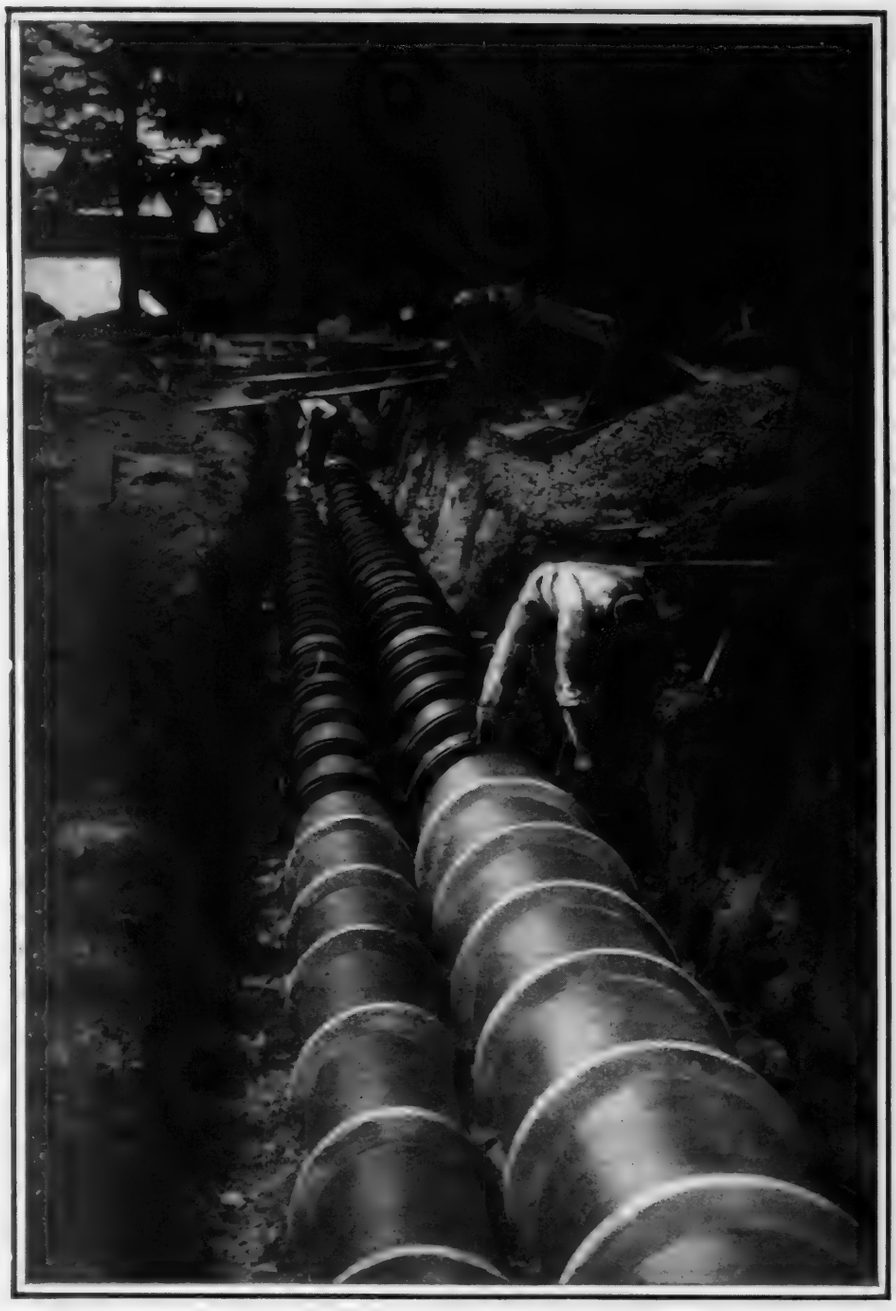
Write for catalog, instruction leaflet and service details.

Aerofin is Sold ONLY by Manufacturers of Nationally Advertised Blower Heating Apparatus.



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American Construction Council convened for its fourth annual meeting, at the Congress Hotel, Chicago, November 18-21. The key-note of the convention was "Better Building," and papers on various phases of high-class construction were presented by men of national repute. Of the many papers presented, the following will indicate the scope of the convention: "The Place of Design and Construction Materials and Methods in Better Building," Max Baumann, National Association of Builders Exchanges, New York; "The Economic Importance of Construction," Harry A. Wheeler, president, Union Trust Co., Chicago, and vice-president of the American Construction Council; "The Movement for Better Homes in America," Dr. James Ford, Washington, D. C.; "Better Building from the Building Officials' Standpoint," Frank Burton, president, Building Officials' Conference, Detroit, Mich.; "Reduction of Construction Peaks and Depression," Wright D. Goss, chairman of board, Empire Brick and Supply Co., New York.

International Trade Exhibition, which was opened on September 14, in a magnificent $5,000,000 exhibition building at New Orleans, will be a permanent institution, having for its main object the increasing of sales in the New Orleans territory, with its population of 11,000,000 people; in Mexico, and in the Latin American countries which are readily accessible from the port of New Orleans. The institution is co-operative, and is operated without profit. A series of motion pictures, costing $50,000 to produce, is now being completed for international release. The exhibition is fortunate in having secured the co-operation of the War Department of the United States government, through which it leases the building at $1.00 per year. Eleven States have pledged co-operation and several foreign countries will be represented. Provision is made so that exhibitors may maintain permanent offices, may have exhibits with or without their representative in charge; or may arrange for introductory selling, direct to the consumer. Many ramifications have been worked out to the end that the commercial interests of the country be served to the best advantage; and that the products of manufacturers or the inventions of individuals may be placed in the best possible light.

New York—Reports on planning and construction of schools, in New York City, show that the slowing up is continuing. In a space of six months the total of school construction has decreased more than 50%. In September 1924, it is reported that buildings were under contract providing for nearly 150,000 seats. In September 1925, the total capacity under construction was 65,000 seats. Of the total buildings under contract on September 1, the building department has now made available 41,000, leaving approximately 24,000 under contract. This is the smallest number of new buildings under contract at one time since the initiation of the huge school building program of the Board of Education.

Phillips-Getschow Co., Chicago, Ill., has the distinction of having been awarded two of the largest heating and ventilating contracts of the year. One is for the equipment for the new Palmer House, and the other for the new Stevens House, both in Chicago. The Palmer House installation will include 150,000 sq. ft. of radiation, while the new Stevens Hotel will require 137,000 sq. ft. of radiation.

Central Supply Association held its annual meeting in Chicago, October 21-22, and elected the following officers for the coming year: William B. Bryar, of Bailey-Farrell Mfg. Co., Pittsburgh, president; Isidor Weil, Weil-McLain Co., Chicago, first vice-president; F. N. Kretschmer, of Kretschmer Mfg. Co., Dubuque, Iowa, second vice-president; C. V. Kellogg, of Kellogg-Mackay Co., Chicago, treasurer. Concurring with the report of the executive committee, an amendment to the constitution was passed increasing the personnel of the executive committee. This committee, after analyzing the report of Secretary McCollum on credits and collections rec-

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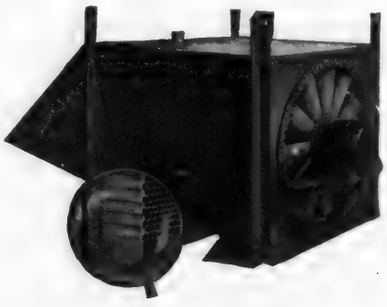
Recommendations and prices furnished cheerfully without cost to you.



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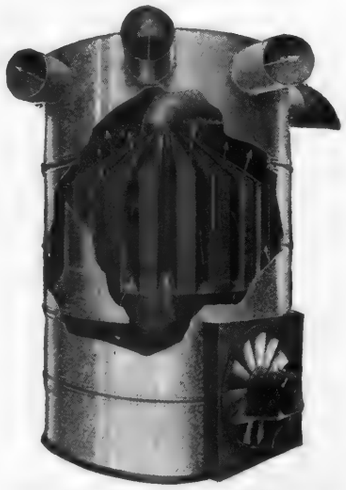

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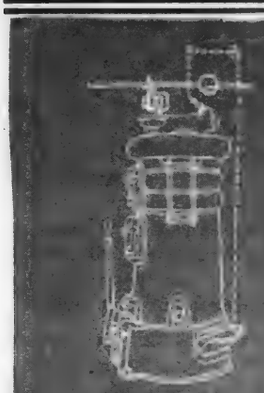
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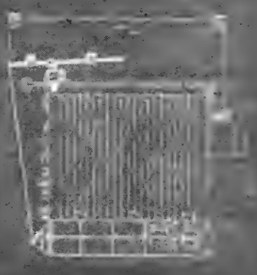
PIERCE-PEBCO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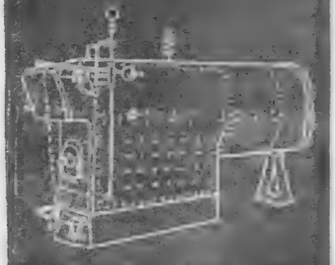
OIL CITY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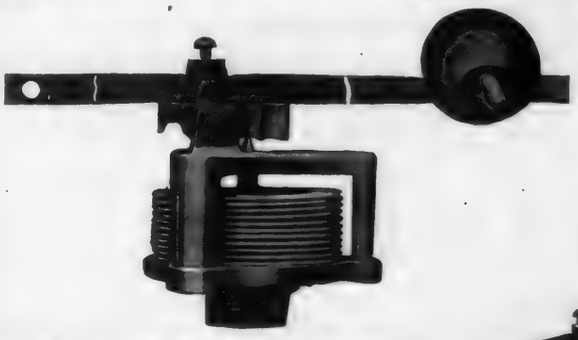
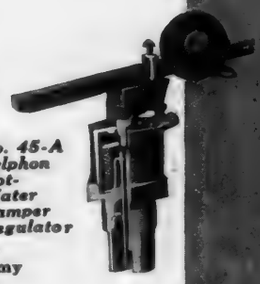


No. 22—Sylphon Damper Regulator for low pressure steam boilers

No. 924 Sylphon Steam Damper Regulator, extra sensitive type



No. 45-A Sylphon Hot-Water Damper Regulator

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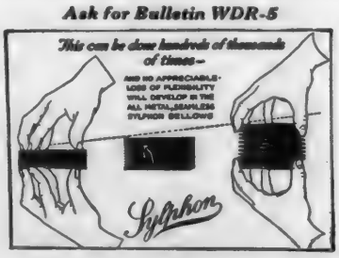
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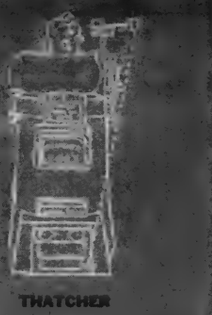
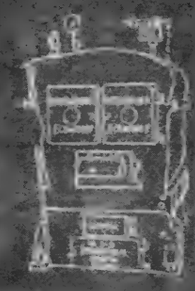

THATCHER

RICHARDSON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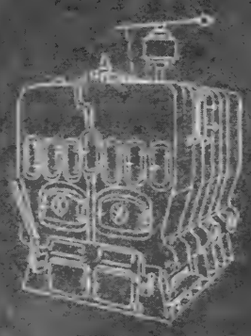
BURNHAM

BIRCHFIELD

ommended the employment of the Chicago Credit Company by the association, their services being placed at the disposal of all subscribing members.

W. H. Clarke, special counsel of the American Fair Trade League, addressed the convention on the subject of "Resale Price Control." Following his talk a resolution was adopted, placing the Central Supply Association on record as urging the enactment of federal legislation which will legalize the right of any manufacturer to enter into enforceable contracts with established retail prices.

Charles K. Foster, vice-president of the American Radiator Company, spoke on "Partial Payment Plans," advising the members of the association to make a careful study of the scope and practice of this method of doing business. Twenty-three firms were elected to membership in the association.

Manufacturers' Notes

Richardson & Boynton Co., New York, announces the resignation of A. H. Richardson, second vice-president, and the election of W. R. Eaton, formerly secretary-treasurer, to fill the vacancy. Roger Williams was elected to fill a vacancy on the directorate. The present executive organization is as follows: D. R. Richardson, president; A. P. Richardson, first vice-president; W. R. Eaton, second vice-president; D. S. Richardson, treasurer; H. T. Richardson, secretary, and Arthur Nichols, assistant secretary. Mr. Eaton has been associated with the Richardson & Boynton Company for over twenty-five years, and his elevation to the vice-presidency is a deserved recognition of his executive abilities. Mr. Eaton will, for the present, be placed in charge of the Chicago branch office.

Linde Air Products Co., New York, has elected G. W. Mead, formerly president, to the chairmanship of the board

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makes
"Every day a good day"
Humidification · Dehumidification
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TWINFAN Unit Heaters

"That's Luck—Not a Single Suspended Pipe Coil"

THAT'S what you'd be likely to say if you got a big industrial job like the one pictured, without a single radiator or pipe coil suspended in the sawtooth or under the roof. You know how the long complicated pipe runs eat up labor estimates and sometimes leave you on the wrong side of the ledger when the job is done.

But it isn't luck that gets you out of such difficulties. It's the TwinFan Unit system of heating. Each TwinFan Unit like the one shown has a heating capacity equivalent to more than seventeen ordinary radiators. The heat is kept down where it is needed. Your customer saves and gets better heating results. You save labor and are more sure of your normal profit.

Let us help you sell one industrial installation as a demonstration of what the TwinFan System can do both for you and for your customer.

DWYER EQUIPMENT COMPANY
4534 W. NORTH AVE. CHICAGO, ILL.

He'll thank you for the hint

YOUR piping contractor will thank you for this hint—Grinnell Pipe Hangers. Their use will cut his labor costs just as they have always cut ours. And we've used a dozen million of them. For yourself, you'll get a piping equipment that can always be kept in perfect alignment through the simple adjustable features of these hangers.

These hangers grew out of the practical suggestions of experienced Grinnell construction foremen. That's why they solve actual field problems of hanging pipe and radiators anywhere. Since they can be bought on the open market, why be content with anything less than the best?

Write for the free 120-page Grinnell Hanger Catalog. Its illustrations and text will tell you all about the handiest and most complete line of hangers on the market. Address Grinnell Company, Inc., 280 W. Exchange Street, Providence, R. I.

GRINNELL

Fittings, Hangers, Valves, Pipe Bending Welding, Piping Supplies, etc.

of directors. W. F. Barrett, formerly vice-president, has been elected president. Other changes include the election of R. R. Browning as vice-president in charge of sales and J. A. Rafferty as vice-president, in charge of engineering, manufacturing and research.

Excelso Specialty Works, Buffalo, N. Y., announces the removal of its main offices from 119 Clinton Street to 65 Clyde Avenue, Buffalo, where larger quarters have been acquired.

Pierce, Butler & Pierce Mfg. Corp., New York, has acquired an interest in the Lambertville Pottery Co., and Philip J. Faherty, formerly vice-president of the Lambertville Pottery Company, has been made vice-president and manager of sales for Pierce, Butler & Pierce Manufacturing Corporation.

Wolff Range Boiler Manufacturing Co., Chicago, has purchased a three acre plot on Western Boulevard, and is remodeling the plant formerly owned by the Brady Foundry Company, to meet its needs.

Frost Mfg. Co., Galesburg, Ill., manufacturers of the Ross steel boilers, has appointed Paul J. Purcell as Chicago representative. Mr. Purcell was formerly associated with the Herbert Boiler Company.

Fairbanks Co., New York, has appointed August Buschmann & Sons, Inc., Indianapolis, as exclusive dealers for Fairbanks valves.

Foxboro Co., Inc., Foxboro, Mass., has transferred its southern office to Atlanta Trust Building, Atlanta. This office, which has been located in Birmingham, will be in charge of A. W. Taber, for several years sales engineer for the Foxboro Company.

Bell & Gossett Company, Chicago, manufacturers of the Unitem submerged water heater, has removed to its new factory at 3000 Wallace Street, Chicago.

Montgomery Bros., Chicago, general sales agents for the United States Ozone Company, announce that increasing business necessitates moving into larger quarters. The chemical research laboratory, engineering department and general sales office are now located at 500 North Dearborn Street, Chicago.

Hoffman Specialty Company Host to Jobbers and Salesmen in Detroit

Over 200 jobbers and salesmen were the guests of the Hoffman Specialty Company at a meeting and supper on October 28, at the General Motors Building, Detroit. W. Bowles, manager of the company's Detroit office presided, and first introduced Guy Hutchison, vice-president and general manager, who outlined the Hoffman sales policy and explained the extent of the direct-to-consumer advertising, and its benefit to the trade and to the company.

Charles V. Haynes described the design and operation of the Hoffman No. 2 valve. Mr. Hutchison then explained the Detroit intensive advertising campaign, which opened with a full-page display in the *Detroit News* for Sunday, November 8. Large proofs of this page had been distributed to contractors, and salesmen personally distributed literature with return post cards, addressed to the contractors. Mr. Pann, of the *Detroit News* told of the potency of his advertising pages, and executives of distributing houses voiced their approval of the campaign. Frank Gaylord, manager of the Chicago office and George Suits, in charge of the Hoffman interests in Boston, attended the meeting and assisted in the campaign. At the conclusion of the meeting a buffet supper was served.

Central Station Heating Notes

Austin, Minn.—Bain and Robb, of St. Paul, heating engineers, have prepared plans and specifications for a central heating plant in Austin. An approximate cost of the installation will be $60,000, and the tentative plan contemplates the sale of steam at $1.00 per 1000 lbs.

State Teacher's College, Duluth, Minn., will have a central heating plant, according to plans of the State Department of Administration and Finance, St. Paul, Minn. It is proposed to construct

LIBRARY BUREAU
CHICAGO

U. S. CONTROLLED OZONIZER

was installed in this modern office building to handle a particularly bad condition of intake air.

Zest, freshness and complete absence of odors characterizes the air of this building.

We maintain our own Research Laboratories and Engineering Staff. Technical publications on OZONE air conditioning and water purification sent on request.

MONTGOMERY BROTHERS

CHICAGO 500 NO. DEARBORN ST. | SAN FRANCISCO 61 FREMONT ST. | NEW YORK 50 CHURCH ST.

General Sales Agents for

THE UNITED STATES OZONE COMPANY
SCOTTDALE, PENNA.

Sells and Satisfies

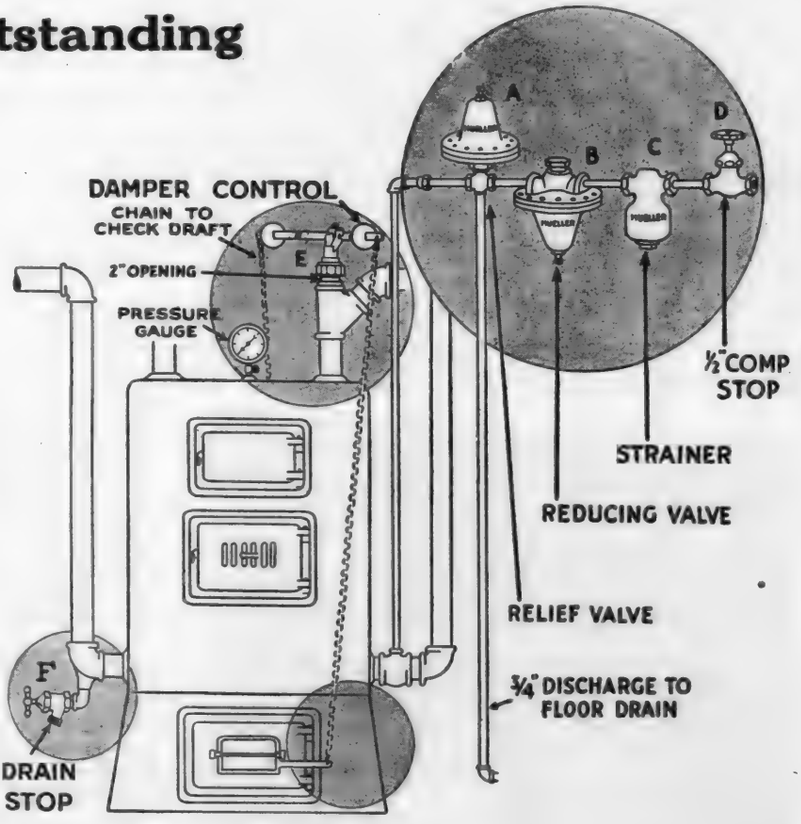
It is easy to sell Mueller's System of Hot Water Heat Control. Its operation is automatic and requires the least amount of attention.

There is no expansion tank nuisance, for both the overhead open tank and the closed basement tank are eliminated. This means less trouble and expense for your customer and a big reduction in installation costs for you. The cost of the Mueller system to your customer is no more than the cost of the antiquated and troublesome open or closed tank systems.

The Mueller Automatic Hot Water Heat Control makes friends because of its perfect operation. Hundreds of installations have proved its absolute reliability and its economy in fuel consumption. Every installation that you make will increase your business, for satisfied users are the biggest factor in the remarkable increase in Mueller sales everywhere.

Note these outstanding advantages

1. No expansion tank, either open or closed.
2. Quickly installed on either new or old jobs.
3. Water in system always fresh.
4. Rapid circulation, due to pressure and fresh water.
5. Entirely automatic as to supply, relief and damper regulation.
6. A very considerable saving in fuel, due to automatic control of dampers and rapid circulation.
7. Perfectly safe, as both reducing valve and relief valve are operated by the pressure of the water in the system. These valves are especially constructed and tested for use on this system.
8. The reducing and relief valves are positive in action and durable, the working parts being made of bronze with phosphor bronze diaphragms.
9. Boiling point of water raised to higher point than with open system.



MUELLER CO.

(Established 1857)

Factories: Decatur, Ill.; Port Huron, Mich.

Canadian Factory:
MUELLER, Limited, Sarnia

Branches:
New York, San Francisco, Los Angeles

MUELLER

Automatic Hot Water Heat Control

this heating plant at the conclusion of the present heating season.

Miles City Industrial School, Miles City, Mont., will shortly have a central heating plant that will cost about $50,000. The State Board of Examiners, Helena, Mont., will receive bids for this plant.

Wells, Minn., will build a central steam heating plant for its City Hall and Auditorium Building. Perry S. Busche, city clerk.

New Ulm, Minn., will soon let a contract for the extension of the underground heating main, of the municipal central heating plant. William P. Backer, city clerk.

New Incorporations

L. C. Aya, Inc., Everett, Wash., capital $20,000, to engage in the heating and plumbing business.

Lowell Oil Heating Co., Inc., Lowell, Mass., capital $10,000, to engage in the oil heating business. Incorporators: Earle H. Chapin and William T. W. Underwood, Reading, Mass.

Houck Plumbing and Heating Co., Detroit, Mich., capital $10,000, to engage in the heating and plumbing business.

Shatles and Feldman Co., N. Y., capital $10,000, to conduct a heating and plumbing business.

Save-U-Ventilating Co., Milwaukee, Wis., capital $15,000.

Cavanaugh Supply Co., organized by M. A. Cavanaugh, who recently resigned from the Richardson & Boynton Co., New York. The Cavanaugh Supply Co. will do a heating and plumbing supply business, with office and warehouse at 150 Northern Blvd., Flushing, L. I. Mr. Cavanaugh was manager of the boiler department of Richardson & Boynton Company.

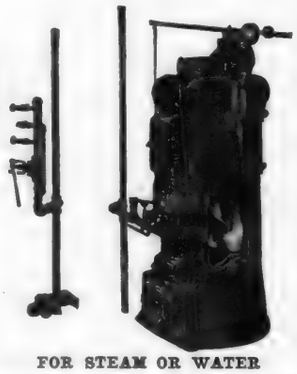
Davis and Warshauer, Inc., to conduct a general supply business, with headquarters at 242 Broome St., New York. Incorporators: Bernard S. Davis, formerly with Daniel-Morris Co., Inc., and

Franklin *New Improved Quick Removable*
GAS BURNER SYSTEM

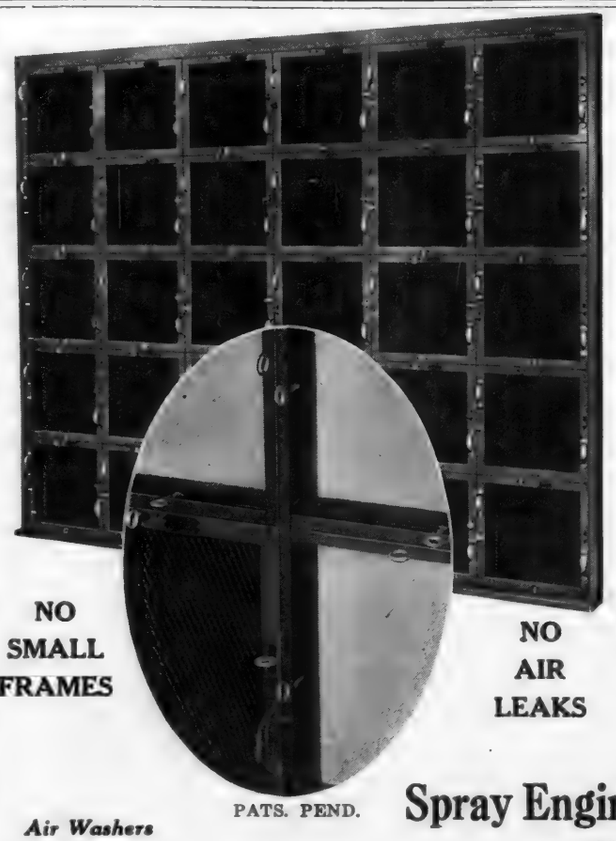
No. 3 System with Thermo Valve and By-Pass

—solves the problem of residence combination gas and coal heating. Can be installed in any hot water or steam boiler, also warm air furnaces of any type. Burner can be removed or reinstalled in a minute's time without use of tools. Economy and perfect combustion under all conditions. Will not backfire. Built in various sizes and units to meet all requirements. Let us send full details.

THE FRANKLIN GAS BURNER MFG. CO.
Vine and Mitchell Aves. CINCINNATI, OHIO
The Apple-Fried Sales Co., 10017 St. Clair Ave., Cleveland, O.
Furnace Gas Burner Co., 452 Lexington Ave., New York, N. Y.



FOR STEAM OR WATER



NO SMALL FRAMES

NO AIR LEAKS

PATS. PEND.

SPRACO
AIR FILTERS

Embody Such Features as –

CORRECT MEDIA PRINCIPLE with resultant high cleaning efficiency. Maximum dust collecting surface area with low resistance. Ample space for retention of accumulated dirt.

MULTIPLE SECTION FRAMEWORK—Vertical members extend continuously from top to bottom. Horizontal members welded to vertical members for increasing strength and rigidity. Minimum erecting expense and no chance for air leakage through framework.

TWO POINT SEAL between cell and framework. All air must pass through filter media.

QUICK ACTING SPRING LATCHES for locking cells in frame work. Facilitates removal and replacement of cells in framework.

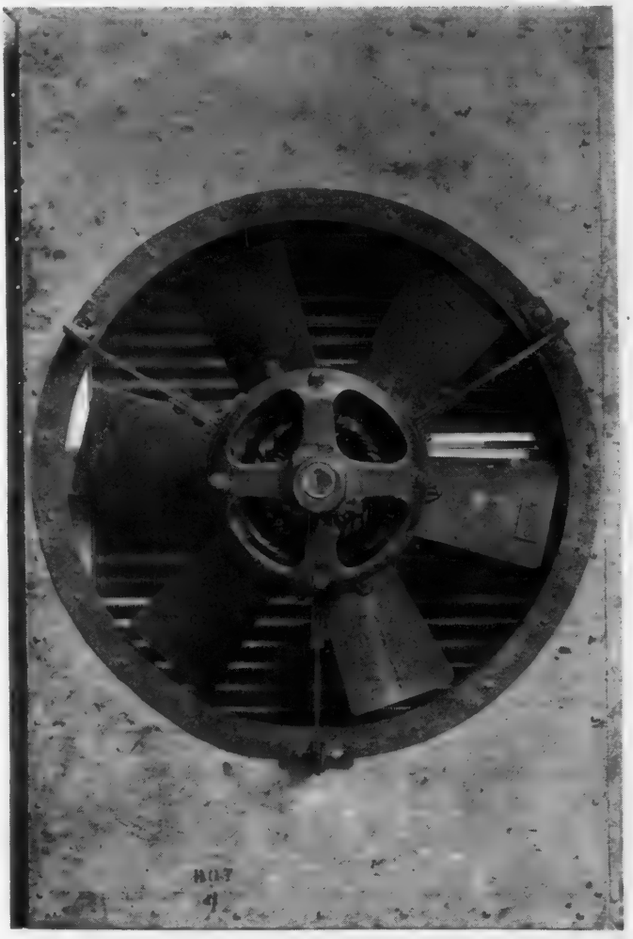
ROTARY WASHING TANKS for large installations. These tanks for cleaning filter cells insure complete removal of all accumulated dirt from filter media with a minimum amount of effort. The rotary tanks like all SPRACO washing tanks are equipped with a water heater ready to connect up to a steam line.

Air Washers
Air Coolers
Spray Nozzles

Spray Engineering Company
60 High Street
BOSTON, MASSACHUSETTS

Cooling Ponds
Flow Meters
Strainers

Complete Heating Satisfaction



You're bound to give your client complete heating satisfaction and a less expensive job when you install Sturtevant Unit Heaters.

Low installation cost has made these heaters the choice of hundreds of contractors. They are compact, easy to handle and require less labor on installation. Therefore, work progresses more rapidly and chances of large losses in figuring time and labor costs are reduced considerably.

Ability to distribute warm air quickly and uniformly, together with low first cost, low operating cost and quiet operation are other features that make Sturtevant Unit Heaters superior. Let us send you our bulletin 323 on Unit Heaters.

B. F. STURTEVANT COMPANY

Sales Engineering Offices

Atlanta, Ga. Los Angeles, Cal.
Boston, Mass. Minneapolis, Minn.
Buffalo, N. Y. Montreal, P. Q.
Camden, N. J. New York City
Chicago, Ill. Pittsburgh, Pa.
Cincinnati, Ohio Portland, Ore.
Cleveland, Ohio Rochester, N. Y.
Dallas, Tex. St. Louis, Mo.
Detroit, Mich. Salt Lake City, Utah
Denver, Colo. San Francisco, Cal.
Hartford, Conn. Seattle, Wash.
Indianapolis, Ind. Toronto, Ont.
Kansas City, Mo. Washington, D. C.

1466

Plants located at

Hyde Park, Mass. Berkeley, Cal. Camden, N. J.
Sturtevant, Wis. Framingham, Mass. Galt, Ontario

Sturtevant
PUTS AIR TO WORK

Foreign Representatives

American Trading Co. Tokio
American Trading Co. Shanghai
Catton Neill Eng. & Mach. Co., Manila
H. P. Gregory Co., Ltd. Sydney
Honolulu Iron Works Co., Honolulu, T. H.
Blair, Reed & Co., Ltd. Wellington
Wesselhoeft & Poor Caracas
Wesselhoeft & Poor Bogota
General Machinery Co. Tampico
Pedro Maritino, Inc. Lima
Compania Italio-Americana de Importacion Buenos Aires
A. E. Barker Johannesburg

Louis Warshauer, formerly with Benjamin Warshauer, Inc.

Duro Air Filter Co., 3151 Shields Ave., Chicago, capital $50,000, to manufacture Duro copper media air filter. Eugene Mathis of A. Mathis & Son, Inc., is president and Henry Mathis of New York Blower Company is secretary of the new company.

WANTED

Advertisements under this heading, $2.00 per inch, payable in advance. A 1-in. advertisement contains 35 words. To secure insertion copy must be received not later than the 20th of the month preceding date of issue.

WANTED—Complete agency information on high-class all-steel furnaces; southern Ohio and northern Kentucky. Address Box 125, care of Heating and Ventilating Magazine.

POSITION WANTED—Construction superintendent, thoroughly experienced in supervising, erecting and estimating heating and ventilating, power and industrial piping, desires permanent connection, with future possibility of purchasing an interest in a live concern. Address Box 115, care of Heating and Ventilating Magazine.

FOR SALE—One 7-ft. Sturtevant fan, suitable for heating and ventilating. As good as new. Address Paul O. Moratz, Bloomington, Ill.

POSITION WANTED—By first-class draftsman. Experienced in the preparation of estimates and layouts for hot water, steam and vapor systems. Young man, single, good education. Desires to make change January 1. Address Box 120, care of Heating and Ventilating Magazine.

SALES ENGINEER WANTED—Address Room 1108, 15 Park Row, New York.

ENGINEER AND SALESMAN WANTED—Position open for capable heating and ventilating engineer and salesman, with well-established contractor located in Ohio. Experience in selling architects' and owners' high-grade heating installations absolutely necessary. Address Box 113, care of Heating and Ventilating Magazine.

"Readers Announcement"

Our Educational Service is being extended to readers of THE HEATING AND VENTILATING MAGAZINE. It is for Manufacturing and Contracting folks, as Employers, Draftsmen, Salesmen, Mechanics, Clerks, Apprentices, etc.

Since 1910 the St. Louis Technical Institute has taught quite an army of folks desiring to improve their opportunities. Our courses are Modern, Comprehensive and Official, and designed to give you those higher, finer touches your profession requires.

We Teach You In Your Own Home, Personal, Clear, Direct

Our School Directory sent Free to interested parties. Indicate your Course when writing.

HEATING VENTILATING ENGINEERING
SPECIAL STEAM AND WATER HEATING
PLUMBING DESIGN AND INSTALLATION
WARM AIR HEATING
CONTRACTING AND ESTIMATING
MECHANICAL DRAFTING

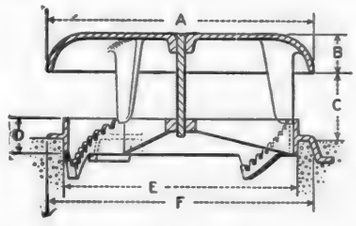
Start with the 1925-26 School Season

ST. LOUIS TECHNICAL INSTITUTE
4541 Clayton Ave., St. Louis, Missouri

STEAM TRAPS AIR TRAPS — STEAM SEPARATORS EXHAUST HEADS — OIL SEPARATORS BOILER ALARM WATER COLUMNS — STRAINERS

WRIGHT — **AUSTIN**

WRIGHT-AUSTIN CO. — DETROIT, MICHIGAN



Nu-Notch
REG. U.S. PAT. OFF.

Mushroom Air Diffuser for Auditoriums

assures the Architect and Engineer who have never used this

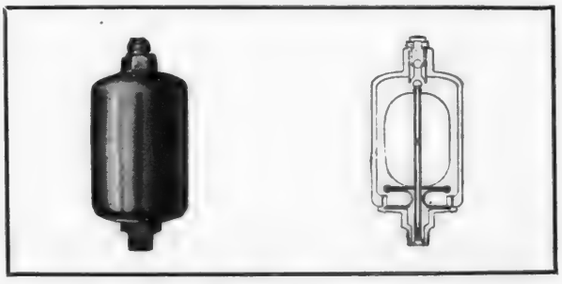
Perfect Air Diffuser

of positive results and everlasting satisfied service.

Costs no more than imitations which lack the essential features embodied in the Nu-Notch.

Insist on "Nu-Notch"

Knowles Mushroom Ventilator Co.
202-204 Franklin St. NEW YORK CITY



"Stay-Rite" Line

No. 4—Float Vent

The Stay-Rite Float Vent is identical to the Stay-Rite Quick Vent with the addition of a float. Venting area is 5/16 inch in diameter.

The Thermostat cuts off positively against steam and the float against water. The light hollow bronze ball which serves as a vacuum check may easily be removed when float vent is used on open systems.

Its large venting port, vacuum breaker, hollow ball check and cast aluminum body are distinctive features.

Let us send full details about the advantages of Stay-Rite Specialties.

The Ideal Heating Equipment Co.
1250 West 4th Street CLEVELAND, OHIO

This Picture of Cleveland tells the story—

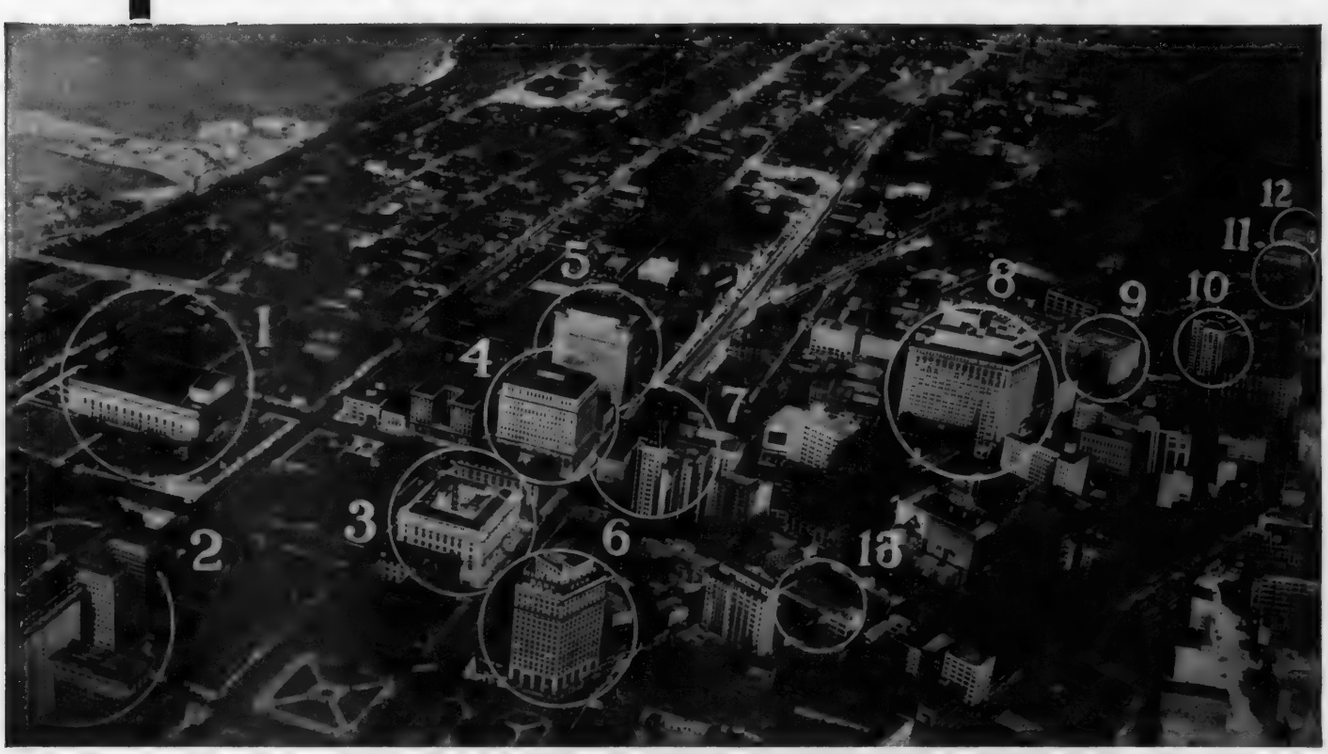
Thirteen buildings in the heart of Cleveland with Buffalo-Carrier apparatus in them. Among the thirteen are the largest buildings in Cleveland.

That's the whole story of "Buffalo-Carrier" equipment. In America's finest structures—in schools, theatres, auditoriums, offices, banks, libraries, stores and public buildings you'll find Buffalo fans and Carrier air washers.

Why?

Because users know that Buffalo fans are quiet, accessible, efficient and reliable. Carrier washers are simple to operate, long lived and have numerous advantages found in no other equipment. If you want to know more, write for catalogs.

Buffalo Forge Company
Carrier Air Conditioning Co. of America
480 Broadway **Buffalo, N. Y.**



1. Public Auditorium.
2. Brotherhood of Locomotive Engineers.
3. Cleveland Public Library.
4. Federal Reserve Bank.
5. Cleveland Discount.
6. Midland Bank.
7. Leader-News Bldg.
8. Union Trust Bldg.
9. Higbee Department Store.
10. Keith Palace.
11. Masonic Temple.
12. Euclid Gardens.
13. Kresge $.25 to $1.00 Store.

"Buffalo"—Carrier heating and ventilating for satisfaction

Showing part of an installation of Tangldust Air Filters in the Allegheny Vocational School in Pittsburgh. They eliminate 97% of the dust and dirt and provide clean fresh air for all parts of the building.

In Pittsburgh, Three Schools Install Tangldust Air Filters

In the Allegheny Vocational School, the Gladstone and the Beltzhoover School you will find Tangldust Air Filters protecting the comfort and health of pupils and teachers. Destructive soot and dirt and bacteria-laden dust cannot pass through the improved two-stage construction of these distinctively different air filters.

While operating steadily at their full initial capacity, Tangldust Air Filters require fewer chargings and less attention than other types, due to an exclusive feature of their construction.

Before you specify, investigate. Send for your copy of Bulletin H.

Send To-day for Bulletin H

Cooling Towers—Air Washers—Spray Systems

The Cooling Tower Co., Inc.
NEW YORK

15 John St. ***Branches in Principal Cities*** **New York**

Inadequate Heating Systems Quickly Replaced or Supplemented by Wing Featherweight Unit Heaters

It requires about two hours to add a Wing Unit to an existing inadequate heating system, to do the work of 30 or 40 radiators.

The Wing Featherweight Unit Heater heats the working level first, maintains an even temperature, and prevents the accumulation of hot air at the ceiling. Its small dimensions and light weight permit of its being installed overhead where it gathers in the warm air as fast as it rises, and redistributes it to the working level.

L. J. Wing Mfg. Co.

Hudson & 13th Sts. New York City

High Grade Self-Improvement Home Study Course in

Gravity Steam and Water Heating

(by Mail)

Covering Fundamentals of Heating—Hot Water Heating Systems—Radiators and Radiation—Gravity Steam Heating Systems—Hot Water and Steam Boilers—Cost Estimates

Written, prepared and handled by

Ara Marcus Daniels, Consulting Engineer

Woodward Bldg. Washington, D. C.

ASK ABOUT COURSE HB NOT A SCHOOL

(Formerly A-EM-DEE Engineering Co.)

For VENTILATION use LYON Toad Stools

They are Vent Caps of great strength, unobstructed throat, rigid non-rattling construction. The adjustment is from full open to full closed. The height of the floor member prevents sweeping dust and refuse into them. Their efficiency and economy make them particularly adaptable for theatres, auditoriums, etc.

Send for table of capacities and velocities. Prices etc

LYON PRODUCTS CO., Inc.

7 So. Dearborn St.

CHICAGO ILLINOIS

Owners
BOARD OF EDUCATION,
Pittsburgh, Pa.

DAVID B. OLIVER HIGH SCHOOL
PITTSBURGH, PA.

Heating Contractor,
R. T. WITHERS SONS CO.
New Castle, Pa.

This Fine New Pittsburgh School Equipped with Buckeye Fans and Buckeye Heatovents

Buckeye Products are the logical choice of a great many engineers and architects for fine buildings such as this, and we are proud to add this new high school building to our long list of installations.

Our equipment, backed by fifty-one years' experience in the heating and ventilating field, is being installed in a large number of both new and old buildings.

The coming vacation period provides an ideal opportunity of replacing your old heating system with the new, modern, economical and health promoting Heatovent System. The Heatovent is very flexible, easy to install, simple to operate, and requires very little floor space. Old buildings in which no means of ventilation have been provided, can be readily and easily equipped with the Heatovent System.

It will pay you to investigate the improved Heatovent System of ventilation and learn its many advantages.

Buckeye Blower Company

Columbus, Ohio

Branch Offices:

372 Whitehall St., Atlanta, Ga.
2126 Edmondson Ave., Baltimore, Md.
333 Jackson Bldg., Buffalo, N. Y.
301 Rose Building, Cleveland, Ohio.
608 Transportation Bldg., Chicago, Ill.
1226 California St., Denver, Colo.
3115 N. Central Ave., Indianapolis, Ind.
1011 Pioneer Trust Co. Bldg., Kansas City, Mo.
1400 Broadway, New York, N. Y.
1236 Callowhill St., Philadelphia, Pa.
709 Columbia Bank Building, Pittsburgh, Pa.
210 Dooly Building, Salt Lake City, Utah.
405 Sharon Building, San Francisco, Cal.
Fales Building, Seattle, Washington.
206 Comstock Ave., Syracuse, N. Y.
1101 Realty Building, Youngstown, Ohio.

PECCO INC. ST. LOUIS

Here Is Your Opportunity

to own a PECCO Heating System which you are now able to purchase on a deferred payment plan. A small down payment and the balance on terms to suit you.

PECCO Heating Systems make for increased efficiency in your production department. PECCO Heating System will reduce loss motion which is so prevalent in industrial plants that are poorly heated.

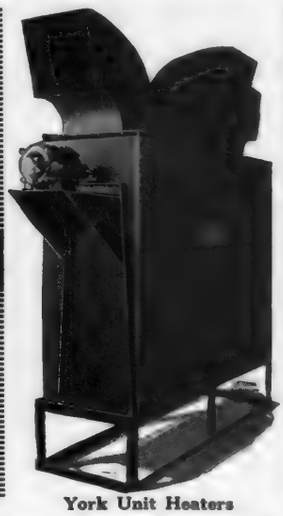
A PECCO Heating System on our deferred payment plan will pay for itself, by improving working conditions, increasing production and greater efficiency. ACT NOW!! Have a PECCO Heating System installed and pay us while IT pays you.

PECCO INCORPORATED

2933 North Market St., ST. LOUIS, MO.

PECCO Heating Systems are built in both steam heated and direct fired systems.

Without any obligation on your part, let our Engineering Department figure your heating problem.



York Unit Heaters

308 York Unit Heaters Ordered by 8 Concerns

A few of the recent orders for York Unit Heaters are as follows: W & J Sloane Mfg. Co., Trenton, N. J.—93 Units; Public Service Production Co., Kearny, N. J.—50 Units; United States Steel Corp., (four plants)—12 Units; American Car & Foundry Co., Madison, Ill.—13 Units. *Don't these quantities indicate that these concerns have no doubt as to the superiority of York Units?*

The Atwater Kent Mfg. Co., Philadelphia, Pa., ordered three times making a total of 38 units, the Pittsburgh Plate Glass Company, Pittsburgh, Pa., ordered four times making 38 units, the Diamond State Fibre Co., Bridgeport, Pa., ordered twelve times, totalling 28 units and the Armstrong Cork Co., Lancaster, Pa., and Camden, N. J., ordered nine times making 36 units. *Don't these repeat orders indicate that these concerns are "completely satisfied" with York Units?*

York Heating & Ventilating Corp.

1506 Locust Street PHILADELPHIA, PA.

JAMES M. SEYMOUR

Established 1888

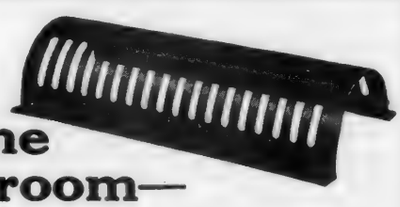
Lawrence St., Mechanic St. and Kirk Place, NEWARK, NEW JERSEY

AUDITORIUM FANS, 36" to 120" to fit any squarer opening. SEYMOUR FANS sold subject to substantial discount. Furnished with suitable pulley or coupling for direct connection TWIN FANS include shafting and center bearing.

Special Fans for Cooling Towers, Heating Systems, Induced Draft, Forced Draft, Dry Rooms, Dry Kilns.

SEND for BULLETINS, PRICES, and DISCOUNTS

Specify the Supreme Mushroom—



for your next theatre or auditorium installation

Greater Air Capacity, Unbreakable, Ornamental, No Rattles, Low Cost.

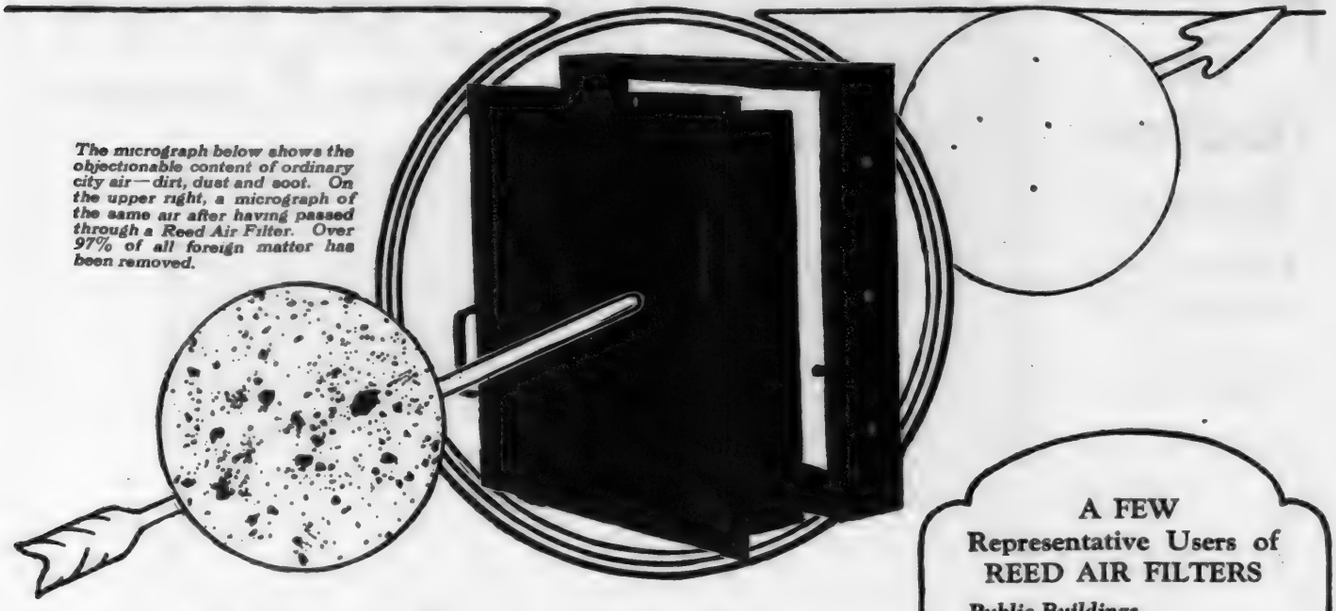
SEND FOR PARTICULARS

Supreme Heater & Ventilating Corp.

Engineers and Manufacturers, ST. LOUIS, MO.

SALES ENGINEERS—Some desirable territory is open on this line.

R E E D A I R I S C L E A N A I R



The micrograph below shows the objectionable content of ordinary city air—dirt, dust and soot. On the upper right, a micrograph of the same air after having passed through a Reed Air Filter. Over 97% of all foreign matter has been removed.

Specifying the AIR *for Your Buildings*

PURE AIR is as important at all seasons as warm air during the winter months. That is why a continually growing number of architects are specifying Reed Air Filters for efficient, economical dust removal from the ventilating systems in every type of building.

In office buildings, schools, banks, factories—wherever dust is a menace to health, fine interiors or costly materials—Reed Air Filters will assure the maximum cleaning ability (97% guaranteed) at the lowest cost. Additional buildings in which Reed Air Filters have been installed are listed on the right. For convenience in obtaining further details, use the coupon.

REED AIR FILTER CO., *Incorporated*
215 Central Avenue, Louisville, Kentucky
Offices in Principal Cities

Reed Air
TRADE MARK
filters ALL METAL

A FEW
Representative Users of REED AIR FILTERS

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Chicago
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New York City
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REED AIR FILTER CO., Incorporated
215 Central Avenue, Louisville, Kentucky
Send, without obligating me, bulletins No. 106, The Reed System of Air Filtration; No. 107, Data, Tests and Specifications; No. 108, Reed Air Filters for General Ventilation.

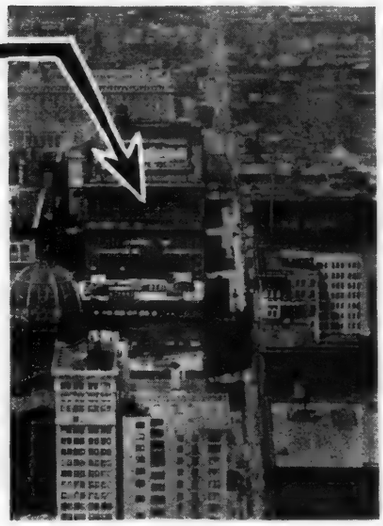
Possible Use.....

Name .....

Address .....

The National Rotary

Cleans Even the Sooty Air of the Chicago Loop



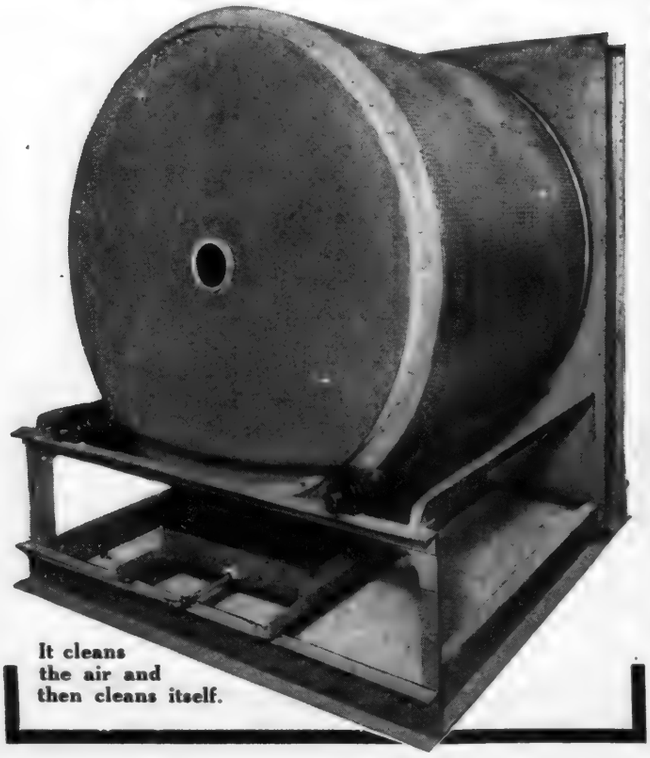
IN the heart of the Chicago Loop District at the spot indicated by the arrow, a National Rotary Air Filter is installed under about as difficult conditions as you can imagine.

Its job here is to take air that is famous for its soot and dirt content and make it fit to ventilate a large rotary converter in a Commonwealth Edison sub-station in the Continental and Commercial Bank Building.

The satisfactory operation of this converter requires air at an absolutely uniform rate of 20,000 c.f.m.—air which is perfectly free from dirt, oil, and moisture. The National Rotary shines the brightest where such conditions exist. The presence of soot in the air is no handicap. This most objectionable element is absolutely eliminated by this filter. Its constant cleaning feature insures perfect uniformity both of air flow and of cleaning efficiency.

National Air Filter Company

9 South Clinton St., Chicago, Illinois



It cleans the air and then cleans itself.

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The latest improvement in Heating and Ventilating Units, equipped with our new Peerfin Radiator. Write for information.

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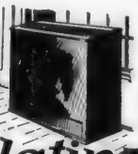
PEERLESS



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Heating and Ventilating

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Cadillac Condensation Meters
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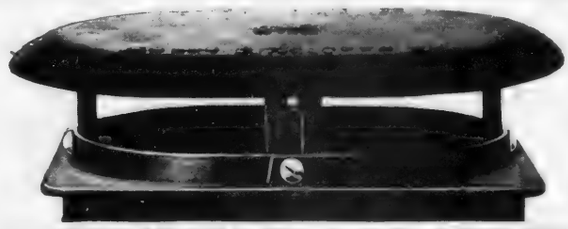

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Round 8" and 10"
Fully and easily adjustable
Rigid and Rugged Cast Iron

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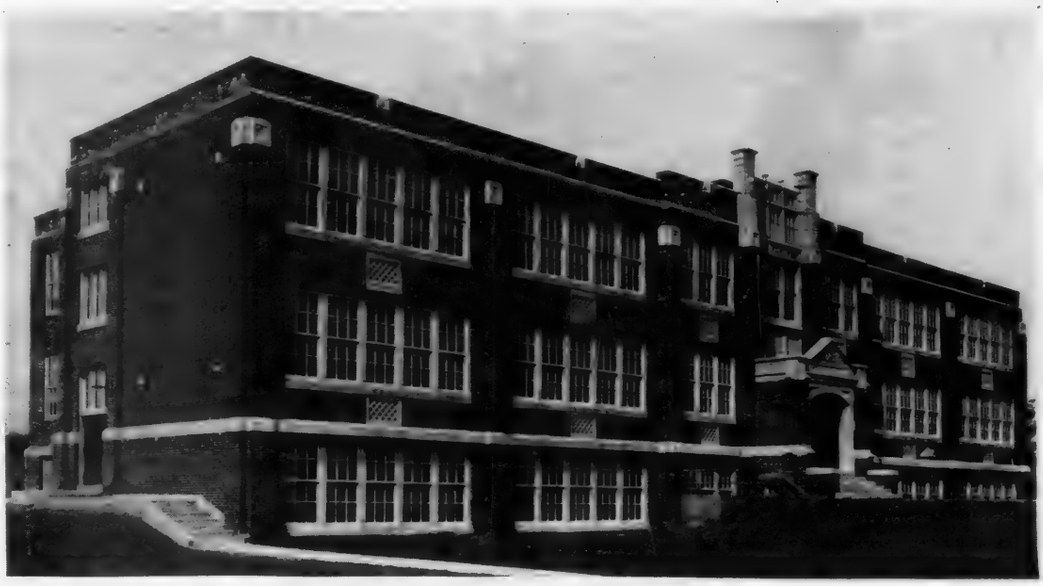
With our labor saving square bottom
Saves money in installing

Universal Unit Ventilation System



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AMBLER, PENNSYLVANIA

Architect
S. J. CONVER

VENTILATION is necessary for good health and is accomplished only by using *fresh* air from outside. The Universal Unit System can be so planned to aid in beautifying the building as well as insuring proper ventilation. This is exemplified in the above building where pierced stone grilles are used for fresh-air inlets to the UNIVERSAL UNITS.

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"The standard by which all other makes are measured"

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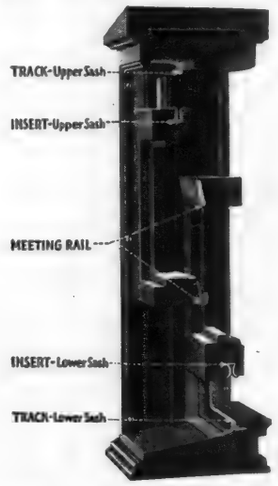
HIGGIN
ALL METAL WEATHER STRIPS



The patent *Insert* strip makes Higgin Weatherstrips extra draft-tight

Higgin Weatherstrips are the only all-metal strips with the self-holding spring flange **Insert** in the sash. This **Insert** is important.

It makes a perfectly draft-tight contact at every point. Swelling or warping cannot prevent accurate fit and closure.

Without the Higgin Metal Insert the wooden groove will wear, swell or shrink, causing sticking or allowing seepage of air through the apertures.

Higgin Strips are "Metal against metal all the way round." Higgin-equipped windows and doors always keep cold air out and warm air in, operate smoothly and easily, and never need refitting.

HEATING ENGINEERS! You can safely guarantee a definite heating efficiency for your equipment when Higgin All-Metal Weatherstrips are installed. They keep all the cold air out and all the warm air in. They never lose their close fit by warping or shrinkage of frames. Every job is installed by trained Higgin men and guaranteed by the Higgin organization. Recommend Higgin All-Metal Weatherstrips to your customers.

The **HIGGIN** *Mfg. Co.*
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Manufacturers of Higgin All-Metal Weatherstrips and Higgin All-Metal Screens

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Adjustable Mushroom Air Diffusers

Type A as shown above complete with galvanized iron sleeve.

are the product of long experience in air distribution. Adjustment simply secured without varying height of tops.

For use in
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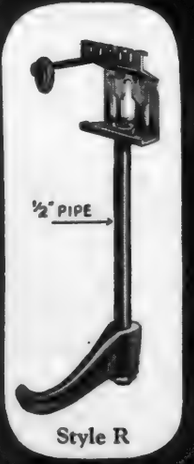
YOU'LL USE 'EM YET!

All parts made of pressed steel except bottom hook support. A strong, simply designed hanger with lateral and vertical adjustments.

Write for ALL the advantages.



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CLEAN AIR For Libraries, Museums, Art Galleries

Dust does enough damage to the decorations and fixtures of any building but in libraries, art galleries and museums there is a much more serious effect. Priceless paintings, valuable books, treasured tapestries and objets d'art of every kind are subject to a never ending dust attack. This in itself makes necessary frequent handling for cleaning and only increases the danger of breakage and other damages, due to carelessness or unavoidable accident.

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Here are some of them:

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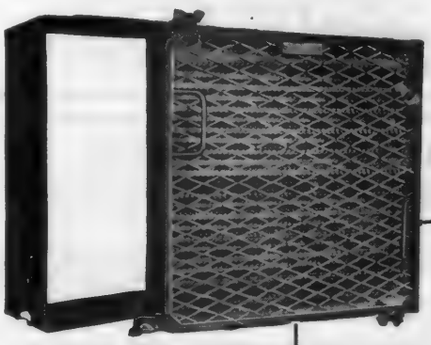
NEW YORK PUBLIC LIBRARY.....NEW YORK
CLEVELAND PUBLIC LIBRARY...CLEVELAND
TOLEDO MUSEUM OF ART.....TOLEDO

If you are now working on buildings of this kind, let us send one of our engineers to discuss the application of Midwest Air Filters in detail.



Cell and Frame New Model Type U2 Midwest Air Filter

Write Dept F 4 for These Folders

Clean Air in Building Ventilation
Clean Air in the Industrial Plant

Outstanding Features of Midwest Air Filters

An installation is built up of standard, interchangeable units (consisting of a frame and a filter cell 20 x 20 x 6½" overall, with a capacity of 800 C.F.M. per unit). A positive air-seal is provided between each cell and frame, and between adjoining frames on all sides.

The unique Midwest baffle-impingement principle makes these filters the most efficient air cleaners in existence. The filter medium consists of a series of specially shaped and perforated metal sheets coated with a sticky viscous fluid. Dusty air in passing through the filter cell, is forced to change its direction innumerable times.

Dust particles are impinged against the sticky surfaces of the filter sheets, where they are caught and held. A series of specially designed sheets of knitted metal mesh are provided at the rear portion of the cell, on which fine dust particles which might pass the first filter sheets are impinged and caught.

Each cell holds a large amount of dust and does not clog up. A constant operating resistance of ⅝" water gauge is maintained by routine cleaning. One man, on a small part of his time, takes care of the average installation.

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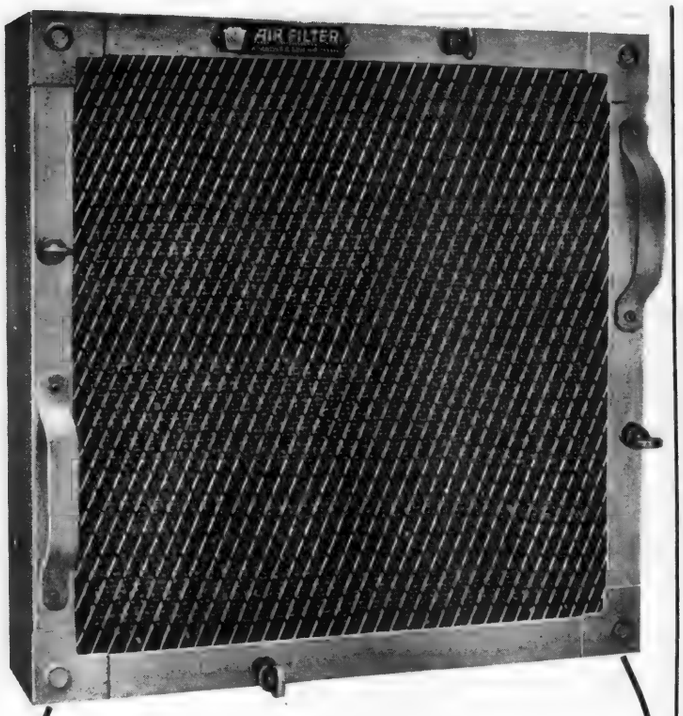

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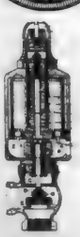

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Create correct ventilation at a pleasingly low cost. The heating and ventilating contractor will find it comparatively easy to sell ventilation this way.

Send for our latest installation manual. It's a complete data book.

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Every Day Brings Added Proof of Its Wonderful Success

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for COAL—GAS—OIL

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The greater accuracy, dependability and beauty of Model 77 established a new standard in automatic heat regulation. Epoch-making sales have resulted. And the faith of the public has been fully justified by the remarkable performance of this new model under all conditions of service. Its tremendous success has made it the most popular heat regulator ever built.

Minneapolis catalog, fully explaining Model 77, will be mailed to you on request.

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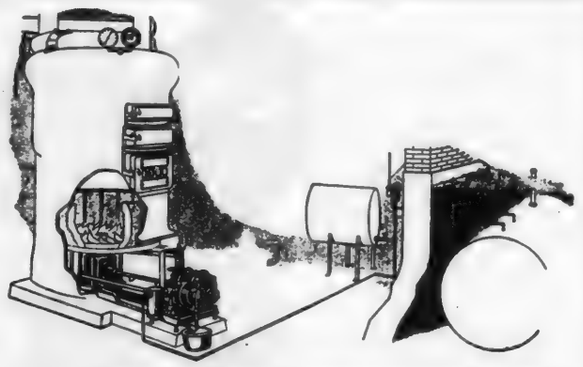
Sold and installed by branch offices in principal cities and 20,000 heating contractors



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THE IDEAL ROTARY is a mechanical draft burner, either full automatic or manual control.

It can be sold in price competition with atmospheric types.

The flame is a circular horizontal sheet, applied at the grate line.

Domestic fuels of all grades commonly supplied may be used. The lower limit is 22° A.P.I.

Manually controlled burners are priced as low as $75.00, net to dealer.

The IDEAL ROTARY makes a strong appeal to the heating contractor because of low price, low cost of installation and simplicity almost eliminating service calls.

A request from you will result in a demonstration of the IDEAL ROTARY, at a time and place to suit your convenience.

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Via ← *Can you remember this word?*

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It means "By way of."

It means that whatever your regulator problem, it can be taken care of

See classified directory for all Atlas Regulating Devices.

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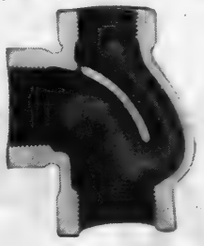

We are the Exclusive Manufacturers of O. S. Distributer and Circuit Fittings

For hot water heating they insure a positive, uniform circulation of the hot water with equal distribution to all radiators. They prevent short circuiting and increase circulation. They save labor, fittings, and joints.

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Michigan and Buttles Aves. COLUMBUS, OHIO

Athey

(Patented)

Cloth-Lined Metal Weatherstrip

Proved so satisfactory in The Blackstone that Marshall & Fox also used them in the Edgewater Beach and Drake Hotels

In 1909 Athey Cloth-Lined Metal Weatherstrip was installed in the Blackstone Hotel. It proved so satisfactory that in 1916 the same architects specified it for the Edgewater Beach Hotel—then in 1920 for the magnificent Drake Hotel.

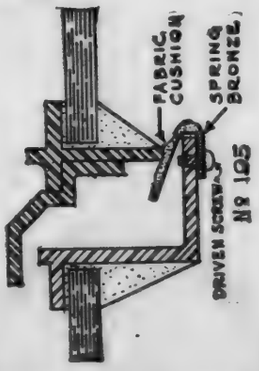
The Blackstone—Chicago

The special features which caused Athey to be selected for these fine buildings were: First, **the coal saving,** due to the elimination of drafts; Second, **the elimination of dust and soot** which cause such havoc with decorations and draperies.

The Edgewater Beach—Chicago

For Wood or Metal Windows

Sketch shows Athey Cloth-Lined Metal Weatherstrip for drawn steel windows. Notice the *cloth and spring bronze contact.* Athey is the **only** cloth-lined metal weatherstrip made, and experience has proved that a cloth-to-metal contact is the only one that actually "seals" the windows without making them stick.



The Drake—Chicago

Athey Products

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Perennial Window Shades Disappearing Partitions
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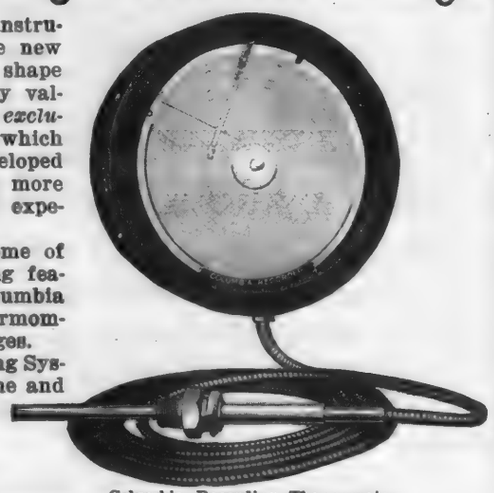
Introducing The New Round Form Columbia Recording Thermometers and Gauges

THESE instruments are new not only in shape but have many valuable new and *exclusive* features which have been developed as a result of more than 75 years' experience.



Columbia Recording Thermometer

Here are some of the outstanding features of Columbia Recording Thermometers and Gauges.

The Recording Systems (bulb, line and spring) are interchangeable. That permits keeping a separate recording system in stock, at small cost, and quickly and easily inserting the new system while the old one is being repaired, should repairs be necessary due to accident. No other instrument has this feature.

Complete instructions are lithographed on the chart plate, so they cannot be lost. Another feature found only in the Columbia.

Time Punch shows when and how often readings are taken. Still another exclusive feature of the Columbia.

Should these instruments be thrown slightly out of calibration by rough handling, any slight inaccuracies can be quickly corrected in your factory by means of an adjusting device, which device can be sealed against tampering.

The chart is held in place by a non-removable clamp, preventing loss of clamp.

Automatic Pen Release lifts Pen Arm away from chart automatically when the door is opened, thus preventing arm from being strained.

Fitted with an Inverted Pen Arm with tension adjusting device and non-corrosive glass pen.

Case is furnished in dull enamel for wall mounting or for flush mounting. The hinged door seats on the inside, against a durable rubber ring, and is pressed against same by means of a screw clamp, making the case absolutely moisture-, fume- and dust-proof.

Columbia Recording Gauge

Has 10" chart with extra large recording area.

Columbia Recording Thermometer is made in 3 types—mercury, gas and vapor tension—for 24, 12 or 7 day periods, in any range up to 1000° F. The Recording Gauge is made for all pressures and for vacuum. *Write for Catalogs No. H-14 and E-14.*

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THE HEATING and VENTILATING MAGAZINE
1123 BROADWAY, NEW YORK

They Often Blame the Heating Plant ~

—but the best heating plant can't heat the whole outdoors . . .

Chamberlin Weather Strips Help Solve the Heating Problem

On the basis of the average wind velocity in the United States—15 miles per hour—the leakage per foot of crack per hour around the sash, including the meeting-rail, of a plain unstripped window is 155 cubic feet. At a wind velocity of 30 miles per hour this leakage is 291 cubic feet per hour. Is it strange, therefore, that homes with the best heating plants that money can buy are often cold or unevenly heated?

By actual tests on 10, 20 and 30 year old installations, Chamberlin Metal Weather Strips and Calking stop from 85 to 95 percent of all possible leakage around doors and windows. With the aid of Chamberlin Metal Weather Strips a good heating plant will function properly with a 20 to 40 percent saving in fuel costs.

Guaranteed for the Life of the Building

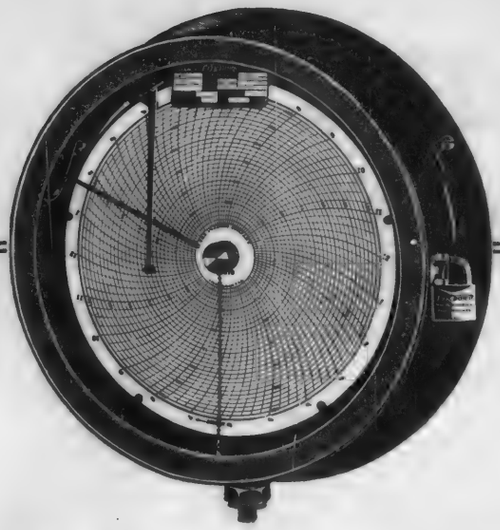
The Chamberlin Company installs its weather strips and guarantees both product and result for the life of the building.

CHAMBERLIN
METAL WEATHER STRIP COMPANY, Inc.

West Lafayette Blvd., Detroit, Michigan

80 Sales and Service Branches throughout the United States

CHAMBERLIN METAL WEATHER STRIPS
"SINCE 1893-THE STANDARD"



The Cost—.5 per cent
The Saving—$26,000.00

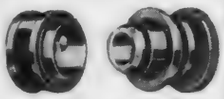
Does Instrument Control of heating plant temperatures and pressures bring about any coal economies?

The cost of Foxboro Instruments installed by a certain manufacturer, including maintenance, amounted to less than half of one per cent of his average annual fuel bill.

Resultant economies saved $26,000 the first year.

Perhaps you will be as surprised to learn, as was this manufacturer, how infinitesimal is the cost of Foxboro Instruments in comparison to the major cost of coal—how small is their cost in comparison with the savings they make possible.

The high quality, the guaranteed accuracy, the dependability of Foxboro Instruments for indicating, recording and controlling temperature, pressure and humidity is undisputed by conservative purchasers of heating plant equipment. Write for Bulletin 96-1.



THE New 3-A Chart Holder is the latest improvement in chart retention and is an exclusive Foxboro feature.
The chart slips into true center, is held securely and yet a twist of the tension head turns the chart to the correct time adjustment. Interchangeable with present chart holders.
Patent Applied For.

THE FOXBORO CO., Inc.
Neponset Avenue, Foxboro, Mass., U.S.A.

New York Chicago Philadelphia Boston Pittsburgh
Cleveland Tulsa Rochester Atlanta
San Francisco Los Angeles Portland, Ore.

FOXBORO
REG. U. S. PAT. OFF.
THE COMPASS OF INDUSTRY

A New and Profitable Field Now Available

C. S. B. Approved Sprinkler Heads may now be bought from us direct, either separately or with all other necessary sprinkler equipment. This opens a new and profitable field for you that has not been available heretofore. There are many prospects for sprinkler systems in your vicinity. Get in on this business at a good profit.

Also, after a fire, sprinkler heads have to be replaced. A stock should be kept on hand for demands of this nature.

Write us for prices and details. We cooperate with you in every way.

C. S. B. SPRINKLER CO.
54 Batterymarch St., Boston, Mass.
Factory: Laconia, New Hampshire
Canadian Representatives: L. E. Moulin Co., Inc., 142 Inspector St., Montreal, Canada.

SHUR-TITE
—The Economical—
BOILER CEMENT

Reg. U. S. Patent Office

POSITIVELY GUARANTEED to seal leaks in Boiler and Radiator Sections. Just the thing to use on new heating installations before tests are made, because SHUR-TITE BOILER CEMENT will find and quickly seal all leaks that occur in new heating jobs.

Any jobber can supply you, or write us for liberal trade discounts.

The Shur-Tite Mfg. Co.
1912 Cleneay Ave., Norwood, Ohio

A New Conception of Thermostat Excellence

You will find the Honeywell new series Thermostats as remarkable in their design, simplicity and quality as the new Honeywell electric motors.

For accuracy, for convenience, for general satisfaction and selling appeal you can't find their equal on the market today.

These new thermostats represent a definite departure from long established methods of design—a genuine advance.

In addition to simplifying the instruments our engineers have materially reduced the size, improving appearance as well as quality.

As line voltage is reduced automatically to low voltage for the thermostat circuit, you thus avoid sources of trouble, delay and expense. The ease with which these thermostats are installed will delight you.

Type Q
Plain Pattern
Thermostat

Honeywell Thermostat Advantages

New 15-20 Day Thermostat equipped with dependable jeweled balance movement clock.

Clock wound from in front.

Thermostat has only one actuating member.

Night and day indicator on dial.

Instantly adjusted by owner for any night and day temperature above or below 70.

Plain pattern thermostat identical with clock pattern, except for clock.

Both thermostats equipped with high grade thermometer and detachable wall plate.

Both secured to wall plate by bayonet catch.

Type R
Clock Thermostat

The new Honeywell series of Automatic Temperature Controls is applicable to all types of heating plants, burning all kinds of fuel, coal, oil or gas. More than 30 oil burner makers now equip with Honeywell.

Write for new low prices, terms and discounts.

THE HONEYWELL HEATING SPECIALTIES CO.
WABASH, IND.

HONEYWELL

Temperature Regulators

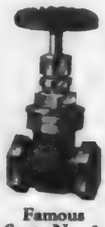
Scott Bronze Gate Valves

No. 0	—S.E. Solid Wedge—Non-rising Stem	125 lbs. S.W.P.
No. 1	—S.E. Split Wedge—Non-rising Stem	125 lbs. S.W.P.
No. 2	—F.E. Split Wedge—Non-rising Stem	125 lbs. S.W.P.
No. 6	—S.E. Hose Gate—Non-rising Stem	125 lbs. S.W.P.
No. 22	—S.E. Quick Opening Gate—	125 lbs. S.W.P.
No. 23	—F.E. Quick Opening Gate—	125 lbs. S.W.P.
No. 170	—S.E. Solid Wedge—Non-rising Stem	150 lbs. S.W.P.
No. 171	—F.E. Solid Wedge—Non-rising Stem	125 lbs. S.W.P.
No. 172	—S.E. Solid Wedge—Non-rising Stem	175 lbs. S.W.P.
No. 173	—F.E. Solid Wedge—Non-rising Stem	175 lbs. S.W.P.
No. 41	—S.E. Solid Wedge—Non-rising Stem	250 lbs. S.W.P.
No. 42	—F.E. Solid Wedge—Non-rising Stem	250 lbs. S.W.P.
No. 1-A	—S.E. Solid Wedge—O.S.&Y.	150 lbs. S.W.P.
No. 172-A	—S.E. Solid Wedge—O.S.&Y.	175 lbs. S.W.P.
No. 41-A	—S.E. Solid Wedge—O.S.&Y.	250 lbs. S.W.P.

Scott Iron Body Gate Valves

No. 35	F.E. Inside Screw—Single Disc	40 lbs. S.W.P.
No. 35-A	—F.E. O.S.&Y.—Single Disc	40 lbs. S.W.P.
No. 300	—F.E. Inside Screw—Solid Wedge	100 lbs. S.W.P.
No. 301	—S.E. Inside Screw—Solid Wedge	100 lbs. S.W.P.
No. 431	—S.E. Inside Screw—Split Wedge	125 lbs. S.W.P.
No. 432	—F.E. Inside Screw—Split Wedge	125 lbs. S.W.P.
No. 433	—S.E. O.S.&Y.—Split Wedge	125 lbs. S.W.P.
No. 434	—F.E. O.S.&Y.—Split Wedge	125 lbs. S.W.P.
No. 637	—S.E. Inside Screw—Solid Wedge	175 lbs. S.W.P.
No. 638	—F.E. Inside Screw—Solid Wedge	175 lbs. S.W.P.
No. 639	—S.E. O.S.&Y.—Solid Wedge	175 lbs. S.W.P.
No. 640	—F.E. O.S.&Y.—Solid Wedge	175 lbs. S.W.P.
No. 843	—S.E. Inside Screw—Solid Wedge	250 lbs. S.W.P.
No. 844	—F.E. Inside Screw—Solid Wedge	250 lbs. S.W.P.
No. 845	—S.E. O.S.&Y.—Solid Wedge	250 lbs. S.W.P.
No. 846	—F.E. O.S.&Y.—Solid Wedge	250 lbs. S.W.P.
No. 847	—S.E. O.S.&Y.—With By-pass	250 lbs. S.W.P.
No. 848	—F.E. O.S.&Y.—With By-pass	250 lbs. S.W.P.

No. 3



Famous Scott No. 1 Bronze Gate Valve

There's a Scott Valve For Every Job You Have

The Scott Line is Practically Complete

For your convenience in ordering by figure number, we list herewith and in succeeding advertisements Scott Valves for every service.

Scott Gate Valves are full weight, rugged in construction, and are made of the highest grade bronze or iron. They have an enviable record over a period of 40 years for dependable and efficient service.

SCOTT VALVE MANUFACTURING COMPANY, 3962 McKINLEY AVENUE DETROIT MICHIGAN

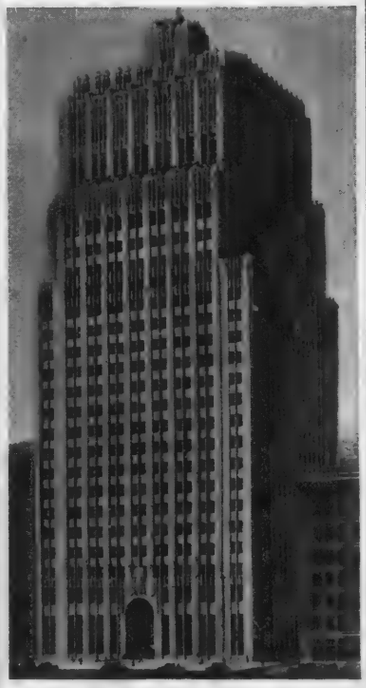
Manufacturers of the Complete Line of

SCOTT VALVES

SINCE 1886

SIGN OF VALUE

"MAXIMUM SERVICE PER DOLLAR"



Pacific Telephone & Telegraph Bldg. Tallest building in San Francisco

GORTON

Quarter-Turn Packing Lock

RADIATOR VALVES

have been installed in this newest of notable buildings.

Completes list of 6 large and prominent buildings erected in San Francisco, using GORTON (Quality) VALVES.

Exclusive Features of Gorton Valve

"Quarter Turn" of the handle operates the valve.

"Packing Lock" (Patented) eliminates leakage and replacement costs.

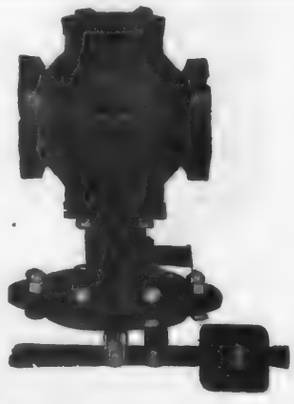
"Full, Unobstructed Path" through the valve eliminates friction, saving energy.

Write for full details of this quality Valve

GORTON & LIDGERWOOD CO.

96 Liberty Street, New York, N. Y.

Established 1887 Representatives in Principal Cities



SATISFIED customers can do a lot of selling for you. They can "put in a good word" when it's most needed. Engineers and contractors who use the Davis P. & W. Pressure Regulator in their steam heating work are making satisfied customers. This automatic valve has no stuffing box—a little detail that the operator greatly appreciates.

G. M. DAVIS REGULATOR CO.

436 Milwaukee Ave., Chicago, Illinois

1875—Valve makers for fifty years—1925

DAVIS VALVE SPECIALTIES

STEAM SAVERS SINCE 1875

H&V12-B-RTG

Made in boards 12 inches by 32 or 36 inches—from 1 inch to 3 inches thick.

Trade Mark

Cork Lined Houses Are Easier to Heat

THE heating system you design will be more efficient and economical to operate if the house is lined with Armstrong's Corkboard. Heat losses through the walls and roof are so reduced by the insulation that not only is the house more easily and uniformly heated, but it can be kept comfortable with from a fourth to a third less fuel.

In a cork-lined house, the added comfort derived from the heating system reflects credit on the engineer who designed it and on the contractor who installed it. You promote your own interests when you recommend Armstrong's Corkboard Insulation, for the protection it affords insures the better performance of your system.

House insulation is rapidly becoming an important factor in your business. It will pay you to know more about it.

Further information will be sent free on request to engineers and contractors interested in easier-to-heat dwellings and apartments. Armstrong Cork & Insulation Company (*Division of Armstrong Cork Company*), 202 Twenty-fourth Street, Pittsburgh, Pa. Canadian office, McGill Building, Montreal, Quebec.

One and one-half inches of Armstrong's Corkboard is equal in insulating value to a 24-inch brick wall.

Armstrong's Corkboard is strong, light and easy to handle. It is nailed against frame construction or put up in Portland cement mortar against brick, stone, concrete or hollow tile. Plaster is applied directly on the cork without lath.

Armstrong's Corkboard will not absorb moisture and does not mold, rot or provide harboring places for rats, mice or vermin. It does not warp, shrink or swell.

Armstrong's Corkboard is slow-burning and a positive fire-retardant. It does not smolder or carry fire.

Branches in the Principal Cities

Armstrong's Nonpareil Corkboard Insulation

for Residential, Commercial and Industrial Buildings

KENNEDY

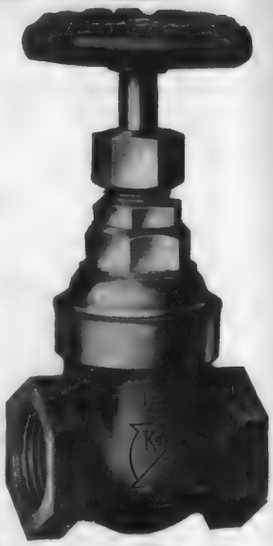
The right type for every service

No matter what your valve requirements may be, you are quite sure to find an exactly suitable selection in the big Kennedy line of 4600 different types and sizes.

For radiator service, for example, the Kennedy Valve patterns include straightway, angle, and offset corner, with or without unions, right or left hand, and with wheel or lock shield and key on operating stem.

For every other service there is a similar wide selection. And no matter what Kennedy Valve you choose, you can be sure of satisfactory services based on half a century of valve-building experience.

Send for the Kennedy Catalogue to help make a selection for trial.



THE KENNEDY VALVE MFG. CO.

Branch Offices and Warehouses:
NEW YORK CITY: 128-132 White St.
CHICAGO: 228 N. Jefferson St.
BOSTON: 47 India St.
SAN FRANCISCO: 448-450 Tenth St.

MEMBERS THE NATIONAL TRADE EXTENSION BUREAU OF THE PLUMBING AND HEATING INDUSTRY. PERMIT No 74 REGISTERED.

Sales Offices:
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EL PASO
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CLEVELAND
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For Dependable Service

Specify

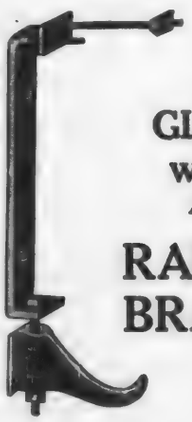
Kelly Automatic Steam Air Valve

All Metal
Non-Adjustable

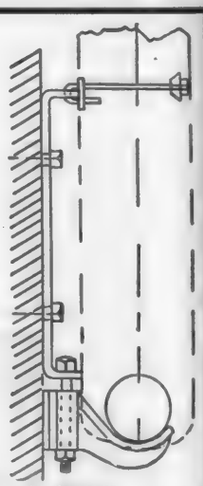
KELLY BRASS WORKS
226 West Ontario St.
Chicago, Ill.

Made in 1/8" standard pipe connection only.

Send for full details



THE GLEOCKLE
Wrought Iron Adjustable
RADIATOR BRACKET



Patented
No. 9 Bracket for Legless Column Radiation

Bound to Meet Requirements

In specifying Gleockle Wall Radiator Brackets you can be sure they will meet all requirements. They are carefully designed and constructed to fit any make of wall radiator, are adjustable, sanitary, indestructible, and easy to erect. They are specified where the best of equipment is required.

FIT ANY MAKE OF WALL RADIATOR

Send for descriptive booklet and trade discount

A. F. GLEOCKLE, Jr.
415 Bay Street Rochester, N. Y.

Why does Oxweld have apparatus repair stations for you?

Apparatus Repair Stations

IF YOU are a user of Oxweld apparatus, your equipment undoubtedly will be working efficiently, because Oxweld fieldmen inspect it from time to time, make adjustments, and supervise minor repairs.

Furthermore, when major repairs are necessary, these can be made at once by the nearest apparatus repair station listed below. These repair stations make it unnecessary to ship your apparatus hundreds of miles across the country to one of our factories. Delays are reduced to a minimum.

OXWELD APPARATUS REPAIR STATIONS

Boston	Massachusetts
Newark	New Jersey
Philadelphia	Pennsylvania
Baltimore	Maryland
Buffalo	New York
Pittsburgh	Pennsylvania
Birmingham	Alabama
Cleveland	Ohio
Chicago	Illinois
Detroit	Michigan
Houston	Texas
Minneapolis	Minnesota
Omaha	Nebraska
St. Louis	Missouri
Tulsa	Oklahoma
Salt Lake City	Utah
Seattle	Washington
San Francisco	California
Portland	Oregon
Los Angeles	California

REGARDLESS of how well oxy-acetylene apparatus is made or how carefully it is used, repairs, replacements and adjustments will be needed if the equipment is to function efficiently day in and day out. In this your oxwelding apparatus is like your automobile.

The automobile makers early learned that repairs for the entire country could not be made at the factory. No owner could afford the delay. Oxweld learned the same lesson, and has already established apparatus repair stations in 20 industrial centers.

Every one of these 20 repair stations is factory supervised and gives Oxweld users quicker and more economical service than would be possible if the apparatus had to be shipped to a distant factory.

When you buy oxy-acetylene apparatus remember that from time to time it will have to be adjusted or repaired and inquire about facilities for this service.

OXWELD ACETYLENE COMPANY

Chicago	Long Island City, N.Y.	San Francisco
3642 Jasper Place	Thompson Ave. & Orton St.	1050 Mission Street

Oxweld

WELDING AND CUTTING APPARATUS

WORLD'S LARGEST MANUFACTURERS OF WELDING AND CUTTING EQUIPMENT

First National Heating and Ventilating Exposition

Including

Plumbing, Refrigerating and Illuminating

March 17th to March 23rd inclusive, 1926

NEW MADISON SQUARE GARDEN—NEW YORK
EIGHTH AVENUE—FORTY-NINTH TO FIFTIETH STREETS

This is the Building in which this EXPOSITION will be held. Best equipped and most centrally located Exposition Building in New York City and within itself contains the very latest and best in the way of Heating, Ventilating, Plumbing, Refrigerating and Illuminating Equipment.

THIS IS YOUR TRADES' EXPOSITION in which you should be represented.

For reservation and particulars apply to the

COMMITTEE HEADQUARTERS,
FIRST NATIONAL HEATING AND VENTILATING EXPOSITION
Suite 334—Hotel McAlpin, New York City
Telephone Pennsylvania 5700 Extensions 332-334-336

Why Wait *for* Hot Water

When you can have it instantly with

DAHLQUIST AQUATHERM COPPER RANGE BOILER

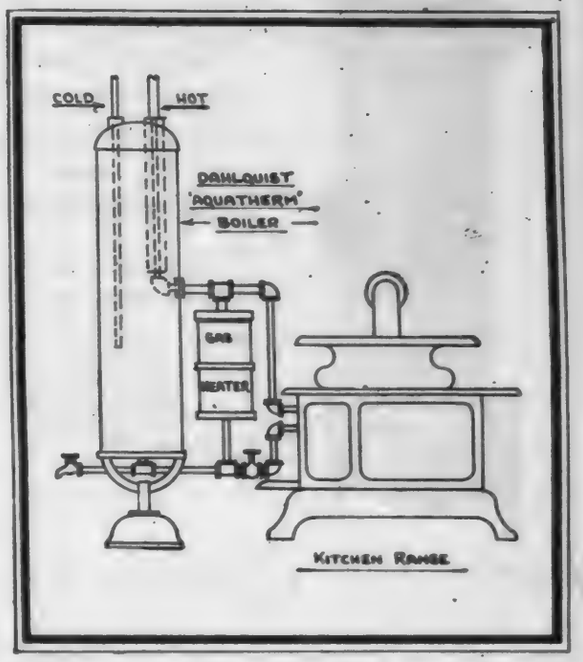
You can have both an instantaneous water heater and a storage system in one, at slightly more than the cost of a copper boiler alone.

The Dahlquist Aquatherm Copper Range Boiler eliminates waiting for hot water. Can be connected to water back in coal range or ordinary gas heater or any of the usual sources of heat. When hot water is not wanted immediately, the Aquatherm stores it in the range boiler. The action is entirely automatic.

The Dahlquist Aquatherm attachment can also be furnished and installed in any other range boiler now in use.

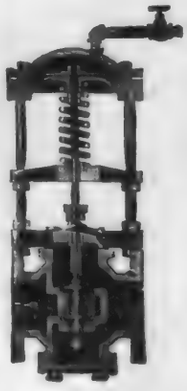
Let us send full details

DAHLQUIST MFG. CO.
40 W. 3rd St. BOSTON, MASS.



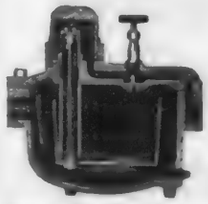
Dahlquist Aquatherm Copper Range Boiler installed in connection with gas tank water heater and water back in coal or wood kitchen range (note the saving of pipe, fittings and labor).

KIELEY
REGISTERED TRADE MARK



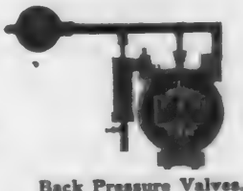
Manufacturers of a Complete Line of Specialties For 46 Years

This illustration shows a Rockaway Pressure Reducing Valve, one of the various types we manufacture. Other types, lever weighted, pilot piston operated and hydraulic operated.



Steam Traps, Bucket and Ball Float Types. All Pressures.

Catalog on Request



Back Pressure Valves, Noiseless Type, Spring or Lever weighted. Sizes 2" to 30"

KIELEY & MUELLER, Inc.
34 West 13th St. New York City

Give them the Best!

Efficient triangular revolving grates—standard equipment for all Thatcher Round Boilers.

IT'S EASY to convince your prospects that in selecting a **THATCHER ROUND BOILER** they are practising true economy in buying the best. In competitive tests, under actual, identical working conditions, it has proved to be the most powerful house heater for rated capacity, both in thermal heat units transmitted and length of time between firing periods. A Thatcher lasts for years—as long as the house itself.

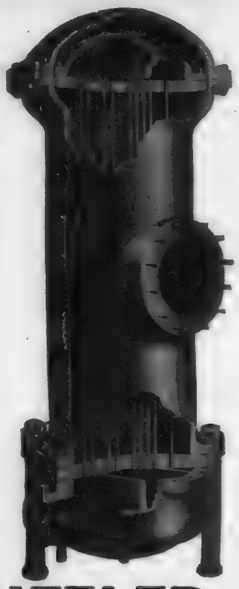
It is always capable of doing its job without bother and heavy coal bills. Once sold it will keep on selling for you. People like its efficiency and talk about it.

We will be glad to show how we can help you to bigger business. Let's get together. A postcard will do.

THE THATCHER COMPANY
Formerly Thatcher Furnace Co.
341 N. Clark St., Chicago, Ill. Since 1850 39-41 St. Francis St., NEWARK, N. J. 21 W. 44th St., New York

THATCHER
BOILERS-FURNACES-RANGES

HEATING SYSTEM CONTROL FROM THE POWER PLANT



THE largest single hot water heating system in the world, located in New York City, serving a group of buildings of approximately eight city blocks, is regulated entirely from the power plant by hourly inspection of outside temperature and adjustment of the steam pressure in Wainwright heaters, and the speed of the Wheeler Alberger circulating pumps forcing the water through the heating system.

A single season's experience furnished the necessary data for predetermining the outgoing water temperature necessary for comfortable heating results at various outside temperatures and individual control of the thousands of radiators in hotel and office rooms served from this plant is entirely avoided.

See our Booth No. 64 at the Power Show

WHEELER CONDENSER & ENGINEERING CO.

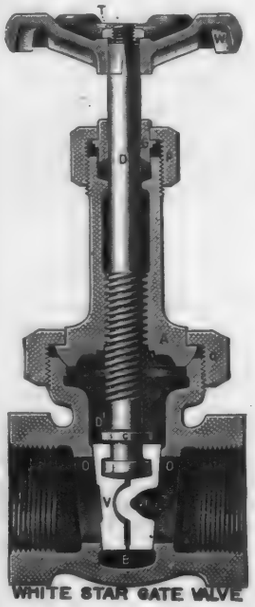
149 Broadway, New York

Works - CARTERET, N.J., NEWBURGH, N.Y.

26

Equally Dependable

for STEAM, WATER, GAS, OIL or AIR



WHITE STAR GATE VALVE

Fig. 375

POWELL White Star Gate Valves

DOUBLE WEDGE DISCS AND SEAT RINGS OF WHITE "POWELLIUM" NICKEL.

Steam Working Pressure up to 200 Pounds.

Order from Your Dealer
Write us for information

THE WM. POWELL CO.

Dependable Engineering Appliances

CINCINNATI OHIO

The STICKLE Thermostatic Radiator Valve

The Expansion principle in return line Radiator Traps is not novel or new. Consequently the difference in this class of Traps is in the construction.

The expansive movement of this diaphragm is fully one-quarter inch, which is much more than is necessary for opening and closing the valve. This gives a factor of safety which is greater than any valve made, consequently it requires no adjustment. May we send you our bulletin?

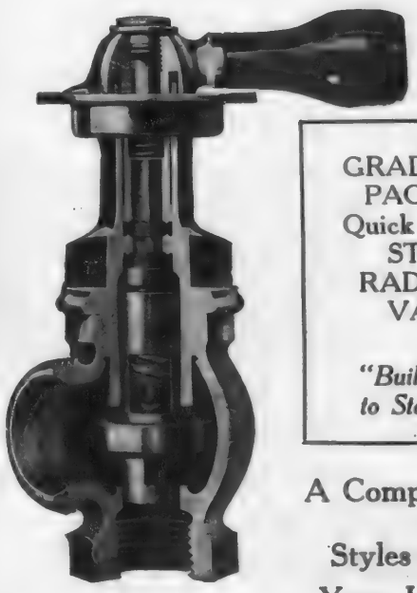
STICKLE STEAM SPECIALTIES CO.

INDIANAPOLIS, IND.

New York Office
46 E. 41st St.

Boston Office
52 Sudbury St.

A High Grade Packless Steam Radiator Valve of Approved Design, Offering the Graduated Feature at a Reasonable Price.



GRADUATED
PACKLESS
Quick Opening
STEAM
RADIATOR
VALVE

*"Built Right—
to Stay Tight"*

A Complete Range
of
Styles and Sizes
Your Jobber Can
Supply You

LAVIGNE
COMMONWEALTH

COMMONWEALTH BRASS CORPORATION - DETROIT

If your customer knows valves

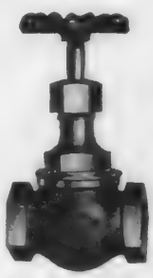


Fig. 106, screwed, Jenkins Standard Bronze Globe Valve

—he knows the Jenkins "Diamond" and the reliable service for which it stands. He knows that you realize the importance of good equipment to good heating service.

Fig. 168, Jenkins Bronze Radiator Angle Valve with male union

If he doesn't know valves he relies on your selection. He thinks of the valves you install as your valves and links your name with their performance.

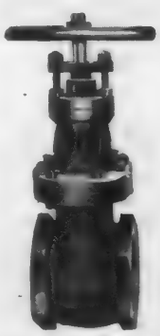


Fig. 325, screwed, Jenkins Standard Iron Body Gate Valve

It always pays a good heating contractor to have his men install Jenkins Valves.

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524 Atlantic Ave.....Boston, Mass.
133 No. Seventh St....Philadelphia, Pa.
646 Washington Blvd.....Chicago, Ill.

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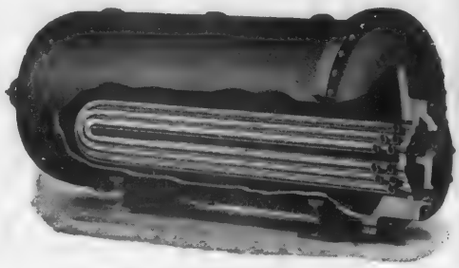
Always marked with the "Diamond"
Jenkins Valves
SINCE 1864

"Give 'Em What They Want"

"Plenty of hot water, low fuel consumption, and a heater that is reasonable in cost, first and last—that's what they all want and why I always give 'em **National Storage Heaters.**

"They use live or exhaust steam, they're mighty easy to get at for cleaning or repairs, and they're dependable always."

Write for Bulletin 65



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STORAGE HEATERS

The National Pipe Bending Company

120 RIVER STREET *Established 1883* **NEW HAVEN, CONN.**

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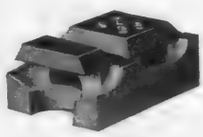
PYRAMID GRATES did that for one man in one heating season.

The same opportunity is awaiting you.



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Scientifically designed for high heat transfer, with Helically corrugated copper tubes. Divided floating tube head that eliminates expansion stress. Consult us on your requirements. Write.

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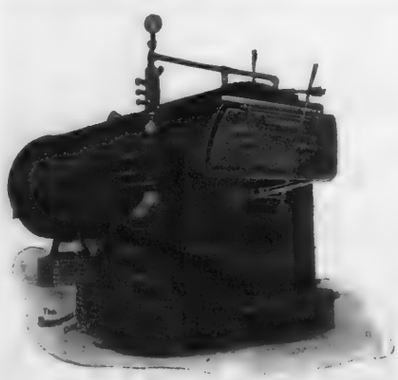

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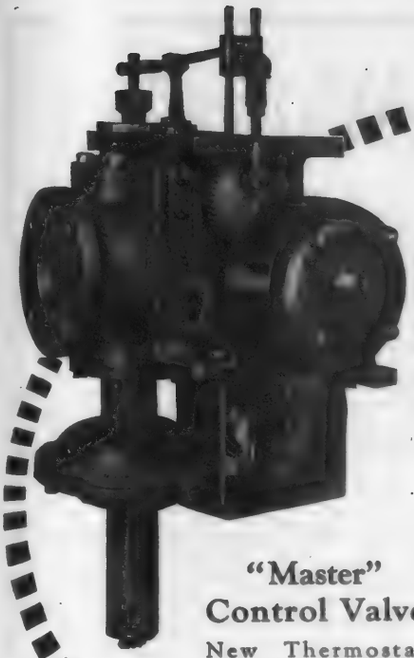

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Sole Canadian Distributor:

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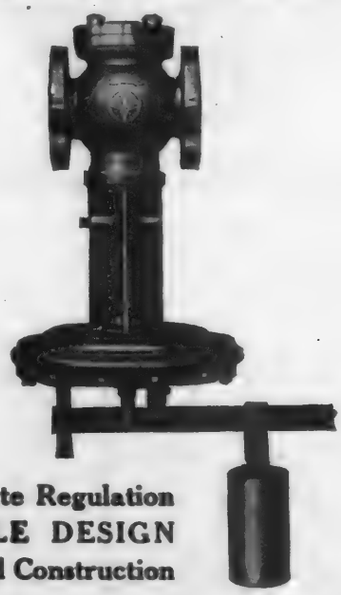

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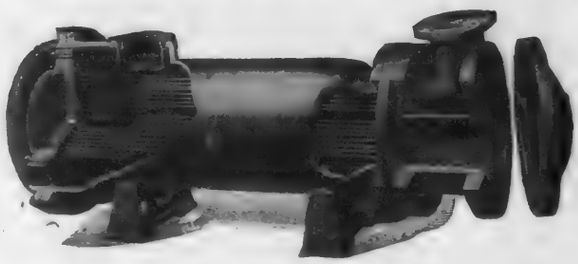

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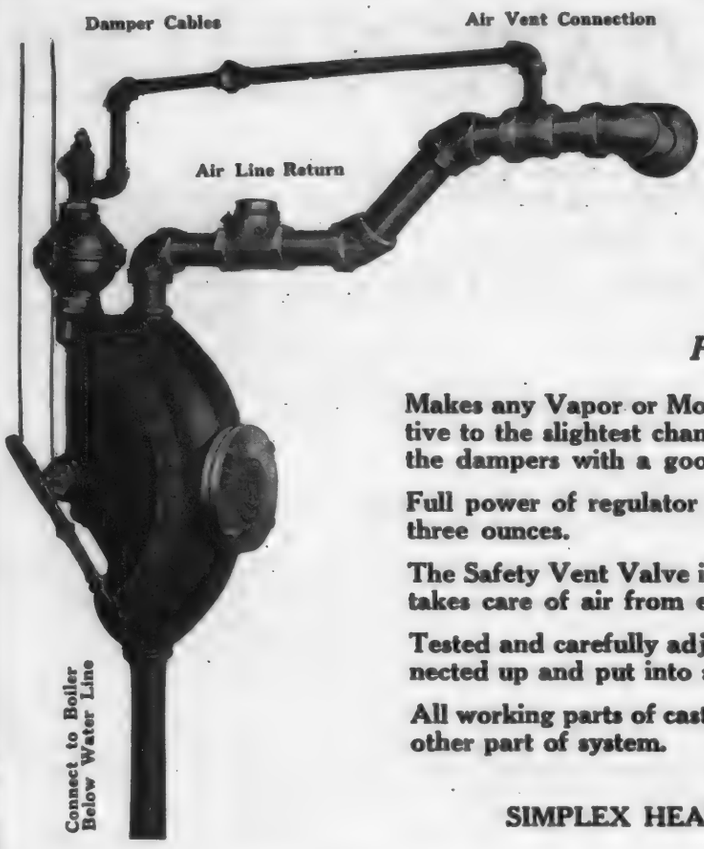

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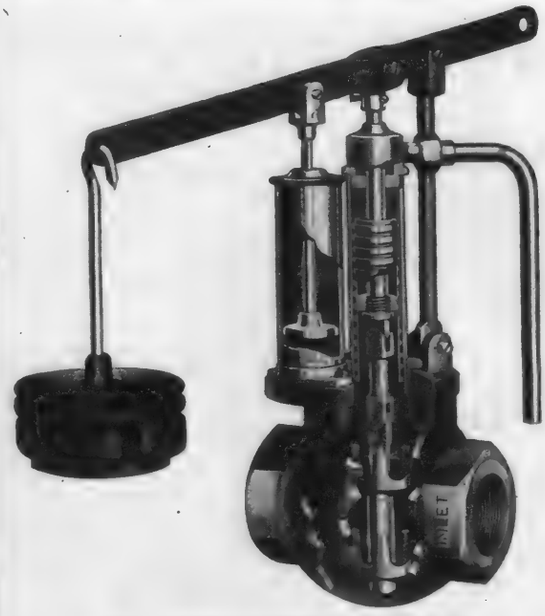

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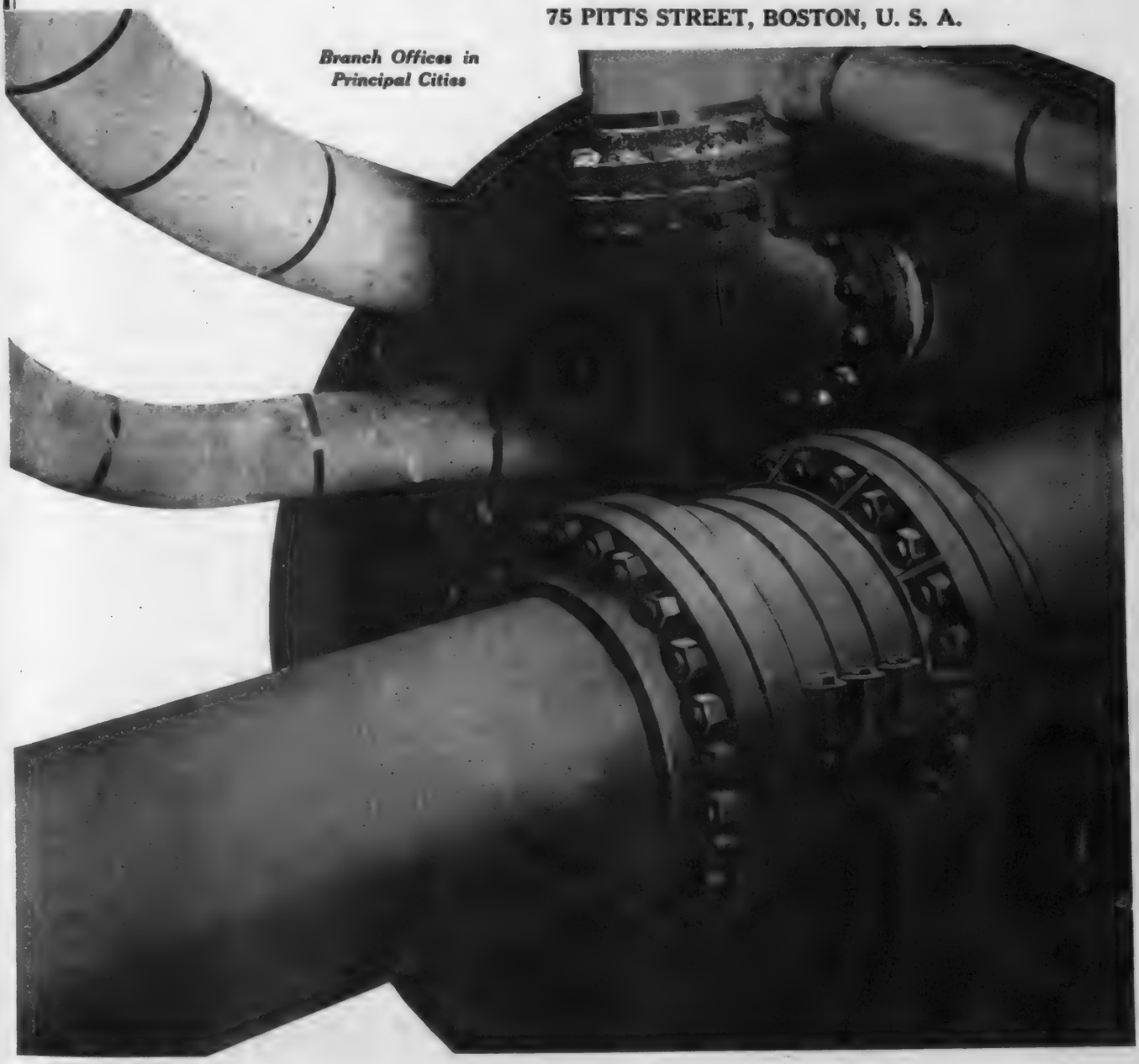

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New York Blower Co., Chicago, Ill.
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Brownell Co., The, Dayton, O.
Clarage Fan Co., Kalamazoo, Mich.
New York Blower Co., Chicago, Ill.
Pierce, Butler & Pierce Mfg. Co., New York.
Sturtevant Co., B. F., Hyde Park, Mass.

EQUALIZING LOOPS.

Hoffman Specialty Co., New York.

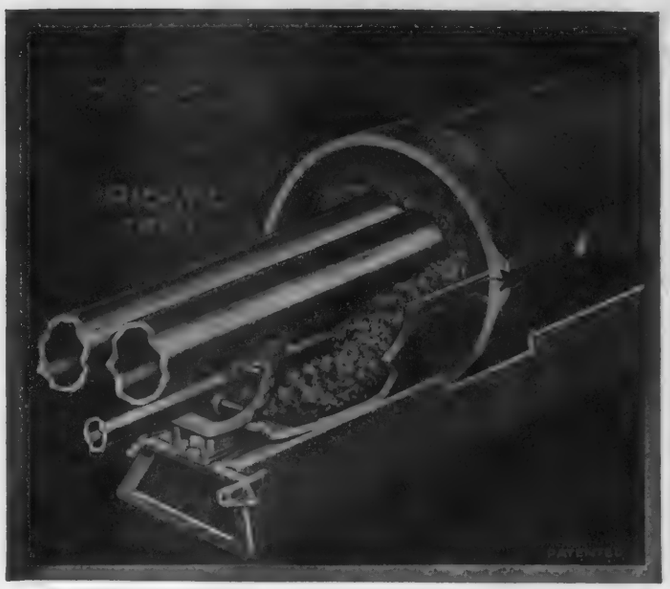
EVAPORATORS.

Boiler Feed Make-Up.

Badger & Sons Co., E. B., Boston, Mass.
Davis Engineering Co., New York.
Griscom-Russell Co., New York.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Whitlock Coil Pipe Co., Hartford, Conn.

EXHAUST HEADS.

Aeolus Dickinson Co., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Patterson-Kelley Co., New York.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
Wright-Austin Co., Detroit, Mich.



Note the compact interlocking construction—base drain supporting the conduit, pipe support carrying pipes free of the conduit, Loc-liP Side Joint sealing the split, and the insulating filler safe from moisture, always efficient.

Dry, Dry, Dry, Dry, Dry—always!

BETTER the bare steam pipes in Ric-wiL Underground Conduit than the finest insulation in a conduit that won't stay dry. For wet insulation is worse than none. It actually sucks the heat out of the pipes. And it can't be wet often and retain its efficiency when it is dried out again.

Ric-wiL, with the Loc-liP Joint and the close-under Base Drain, assures everlastingly dry insulation. It is sealed and protected against moisture at every point. Years of service won't change its dry efficiency. It is the economical satisfactory conduit.

Many more Engineers have specified it in 1925 than ever before. Do you have complete information?

THE RIC-WIL COMPANY, Cleveland, Ohio

Ric-wiL Conduit being installed at Ohio Wesleyan University, Delaware, O.

RIC-WIL

UNDERGROUND CONDUIT

ENGINEERS' SPECIFICATION INDEX (Continued)

EXHAUST SYSTEMS.
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Ilg Electric Ventilating Co., Chicago, Ill.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
Wing Mfg. Co., L. J., New York.
York Heating & Ventilating Co., Philadelphia, Pa.

EXPANSION JOINTS.
American District Steam Co., No. Tonawanda, N. Y.
Badger & Sons Co., E. B., Boston, Mass.
Central Station Steam Co., Detroit, Mich.
Dahlquist Mfg. Co., Boston, Mass.
Griscom-Russell Co., New York.
Hornung, J. C., Chicago, Ill.
Howard Iron Works, Buffalo, N. Y.
Illinois Engineering Co., Chicago, Ill.
Ric-Wil Co., Cleveland, O.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Webster & Co., Warren, Camden, N. J.
Wheeler Condenser & Engineering Co., Carteret, N. J.

EXPANSION SHELLS
Phillips Drill Co., Chicago, Ill.

FANS, EXHAUST.
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Ilg Electric Ventilating Co., Chicago, Ill.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Seymour, James M., Newark, N. J.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
L. J. Wing Mfg. Co., New York.
York Heating & Ventilating Co., Philadelphia, Pa.

FEEDERS
Boiler
Kieley & Mueller, Inc., New York.
McDonnell & Miller, Chicago, Ill.

FILTERS, (Aerating).
Griscom-Russell Co., New York.

Feed-Water.
Davis Engineering Co., New York.
Elliot Co., Jeanette, Pa.
Griscom-Russell Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.

FITTINGS
Groeinger Mfg. Co., Columbus, Ohio.

FITTINGS, FLANGED.
American District Steam Co., No. Tonawanda, N. Y.
Clow and Sons, Jas. B., Chicago, Ill.
Grinnell Company, Providence, R. I.

FLANGES.
American District Steam Co., No. Tonawanda, N. Y.
Jenkins Bros., New York.

GAS BURNERS
Cleveland Gas Burner & Appliance Co., Cleveland, Ohio.
Franklin Gas Burner Mfg. Co., Cincinnati, O.

GASKETS, METALLIC.
Sarco Co., New York.

GAUGE BOARDS.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bishop & Babcock Co., Cleveland, Ohio.
Bristol Co., Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
McAlear Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Webster & Co., Warren, Camden, N. J.

GAUGES.
Altitude.
Pierce, Butler & Pierce Corp., New York.

Draft.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.

Hydraulic.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.

Ounce Graduated.
Marsh & Co., Jas. P., Chicago, Ill.
O-E Specialty Co., Milwaukee, Wis.

Pressure.
American Dist. Steam Co., North Tonawanda, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Pierce, Butler & Pierce Mfg. Co., New York.
Webster & Co., Warren, Camden, N. J.
Bishop & Babcock Co., Cleveland, Ohio.

Vacuum.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Pierce, Butler & Pierce Mfg. Co., New York.
Webster & Co., Warren, Camden, N. J.

Vacuum (Compound).
Cashin Co., W. D., Boston, Mass.
Pierce, Butler & Pierce Corp., New York.

Water.
American District Steam Co., No. Tonawanda, N. Y.
American Schaeffer & Budenburg Corp., Brooklyn, N. Y.
Bristol Co., Waterbury, Conn.
Bristol Co., Waterbury, Conn.
Jenkins Bros., New York.

GENERATOR COOLING SYSTEMS.
Bayley Mfg. Co., Milwaukee, Wis.
Carrier Air Conditioning Co., of America, Buffalo, N. Y.
Cooling Tower Co., New York.
Sturtevant Co., B. F., Hyde Park, Mass.

GOVERNORS, (Pump).
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
Stickle Steam Specialties Co., Indianapolis, Ind.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Wright-Austin Co., Detroit, Mich.

GRATES
Dumping
Pyramid Iron Products Co., New York.
Rocking
Pyramid Iron Products Co., New York.
Shaking
Pyramid Iron Products Co., New York.
Shaking and Dumping
Pyramid Iron Products Co., New York.
Shaking, Circular
Pyramid Iron Products Co., New York.
Stationary
Pyramid Iron Products Co., New York.

HEATERS.
Domestic Water.
Alberger Heater Co., Buffalo, N. Y.
American District Steam Co., No. Tonawanda, N. Y.
American Radiator Co., Chicago, Ill.
Bryant Heater & Mfg. Co., Cleveland, Ohio.
Burnham Boiler Corp., Irvington, N. Y.
Dahlquist Mfg. Co., Boston, Mass.
Davis Engineering Co., New York.
Everhot Heater Co., Detroit, Mich.
Excelso Specialty Works, Buffalo, N. Y.
National Pipe Bending Co., New Haven, Conn.
Page Boiler Co., Wm. H., New York.
Patterson-Kelley Co., New York.
Pierce, Butler & Pierce Corp., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Sims Co., Erie, Pa.
Standard Heater Co., Williamsport, Pa.
Whitlock Coil Pipe Co., Hartford, Conn.

Electrical Unit
Ilg Electric Ventilating Co., Chicago, Ill.

Feed Water, (Closed).
Alberger Heater Co., Buffalo, N. Y.
Davis Engineering Co., New York.
Griscom-Russell Co., New York.
McAlear Mfg. Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Patterson-Kelley Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Sims Co., Erie, Pa.
Wheeler Condenser & Engineering Co., Carteret, N. J.
Whitlock Coil Pipe Co., Hartford, Conn.

Feed Water, (Open).
Griscom-Russell Co., New York.
Sims Co., Erie, Pa.
Stickle Steam Specialties Co., Indianapolis, Ind.
Webster & Co., Warren, Camden, N. J.

Fuel-oil.
Alberger Heater Co., Buffalo, N. Y.
American Blower Co., Detroit, Mich.
Griscom-Russell Co., New York.
National Pipe Bending Co., New Haven, Conn.
Ross Heater & Mfg. Inc., Buffalo, N. Y.
Whitlock Coil Pipe Co., Hartford, Conn.

Air, Fan System.
Aerofin Corporation, Newark, N. J.
American Blower Co., Detroit, Mich.
American Radiator Co., Chicago, Ill.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Mass.

Magazine Feed
Standard Heater Co., Williamsport, Pa.

Portable Unit Air.
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Buffalo Forge Co., Buffalo, N. Y.
Dwyer Equipment Co., Chicago, Ill.
Ilg Electric Ventilating Co., Chicago, Ill.
Pecco Incorporated, St. Louis, Mo.
Skinner Bros. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
Supreme Heater & Ventilating Corp., St. Louis, Mo.
L. J. Wing Mfg. Co., New York.
York Heating & Ventilating Co., Philadelphia, Pa.
(See also Ventilators, Portable Unit.)

HEATING SYSTEMS.
"Gasteam".
James B. Clow & Sons, Chicago, Ill.

Vacuum.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
O-E Specialty Co., Milwaukee, Wis.
Sarco Co., New York.
Standard Heater Co., Williamsport, Pa.
Sterling Engineering Co., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind.
Webster & Co., Warren, Camden, N. J.

Vapor.
American District Steam Co., No. Tonawanda, N. Y.
Barnes & Jones, Boston, Mass.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Gorton & Lidgerwood Co., New York.
Grinnell Company, Providence, R. I.
Haines & Co., Wm. S., Philadelphia, Pa.
Ideal Heating Equip. Co., Cleveland, Ohio.
Illinois Engineering Co., Chicago, Ill.
Illinois Malleable Iron Co., Chicago, Ill.
Klipfel Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Mouat Vapor Heating Co., Cleveland, O.
H. W. Nelson Co., Moline, Ill.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Sarco Co., New York.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Standard Heater Co., Williamsport, Pa.
Sterling Engineering Co., Milwaukee, Wis.
Trane & Co., La Crosse, Wis.
Webster & Co., Warren, Camden, N. J.

Water.
Grinnell Company, Providence, R. I.
Patterson-Kelley Co., New York.
Standard Heater Co., Williamsport, Pa.
Thrush & Co., H. A., Peru, Ind.

HUMIDIFIERS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., Milwaukee, Wis.
Carrier Air Conditioning Co., of America, Buffalo, N. Y.
Carrier Engineering Corporation, Newark, N. J.
Grinnell Company, Providence, R. I.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Seymour, James M., Newark, N. J.
Sturtevant Co., B. F., Hyde Park, Mass.

HUMIDITY CONTROL.
American Blower Co., Detroit, Mich.
Atlas Valve Co., Newark, N. J.
Bayley Mfg. Co., Milwaukee, Wis.
Carrier Air Conditioning Co., of America, Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Foxboro Co., Inc., The Foxboro, Mass.
Grinnell Company, Providence, R. I.
Klipfel Mfg. Co., Chicago, Ill.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Mass.

INSTRUMENTS
Electric Measuring.
Bristol Co., Waterbury, Conn.
Westinghouse Electric & Mfg. Co., East Pittsburg, Pa.

Indicating and Recording.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., Waterbury, Conn.
Bailey Meter Co., Cleveland, O.
Foxboro Co., Inc., The Foxboro, Mass.

If your pumps have all these features, they're "Buffalo"

If you are using pumps that have all the features listed below—they're probably "Buffalo."

1. Casing: Horizontally divided; mounted directly on base. Interior can be inspected without breaking pipe connections.
2. Impeller: Enclosed double suction type, hydraulically balanced.
3. Clearance Rings: Brass. Furnished in casing. Easily renewable.
4. Shaft Bearings: Ring oiling, horizontally split housings. Brackets bolted to casing, one on each side.
5. Thrust Bearings: Collars in each bearing of smaller pumps, marine type on larger sizes.
6. Stuffing Boxes: Extra deep. Brass bushed in smaller sizes.
7. Glands: Bolted type.
8. Water Seals: Brass. Furnished in each stuffing box. Connections cast in casing in smaller sizes.

If you're not using them, right now it is a good time to get all the reasons for the popularity of Buffalo Pumps.

This is the Buffalo Class "S" Pump described at the left. Users say that they save money with this pump.

Buffalo Steam Pump Company

480 BROADWAY BUFFALO, N. Y.

35 Years Experience Makes a Difference

Horizontal Type for Low Pressure Heating Systems, Motor Driven.

The Line Includes

Condensation Pumps, steam and motor driven, vertical and horizontal.

Automatic Boiler Feed Pumps and Receivers.

Boiler Feed Pumps.

Vacuum Pumps, steam and motor driven.

Hot Water Circulating Pumps.

Sump or Bilge Pumps.

AMERICAN-MARSH PUMPS

For Low Pressure Heating Systems

The present high efficiency of American-Marsh pumps is the result of more than thirty-five years' experience in building pumps of all types. American-Marsh Condensation Pumps for low pressure heating systems give long service at low cost.

Made in two types vertical and horizontal, either steam or motor driven. All pumps guaranteed by a company of unquestionable reliability.

AMERICAN STEAM PUMP COMPANY

BATTLE CREEK, MICHIGAN

CHICAGO OFFICE: 1220 Monadnock Block NEW YORK OFFICE: 17 Battery Place

ENGINEERS' SPECIFICATION INDEX (Continued)

Marsh & Co., Jas. P., Chicago, Ill.
Sarco Co., New York
Westinghouse Elec. & Mfg. Co., East Pittsburg, Pa

INSULATING MATERIALS.

American District Steam Co., No. Tonawanda, N. Y.
Armstrong Cork & Insulation Co., Pittsburgh, Pa.
Hornung, J. C., Chicago, Ill.
Johns-Manville, Inc., New York.
Ric-Wil Co., Cleveland, O.
Wyckoff & Sons, A., Elmira, N. Y.

MANOMETERS.

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.

MECHANICAL DRAFT APPARATUS.

American Blower Co., Detroit, Mich.
Buckeye Blower Co,, Columbus, O.
Clarage Fan Co., Kalamazoo, Mich.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park Mass.
L. J. Wing Co., New York.

METERS.

Condensation.

American Dist. Steam Co., No. Tonawanda, N. Y.
Central Station Steam Co., Detroit, Mich.
Hornung, J. C., Chicago, Ill.

Feed Water.

Central Station Steam Co., Detroit, Mich.

Feed Water (Wier Type).

Webster & Co., Warren, Camden, N. J.

Flow

American District Steam Co., North Tonawanda, N. Y.
Spray Engineering Co., Boston, Mass.

Pitot Tube.

American Blower Co., Detroit, Mich.

Steam.

American District Steam Co., No. Tonawanda, N. Y.
Foxboro Co., Inc., The Foxboro, Mass.

MOTORS (Electric).

Sturtevant Co., B. F., Hyde Park, Mass.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

NOZZLES, SPRAY

American Blower Co., Detroit, Mich.
Badger & Sons Co., E. B., Boston, Mass.
Bayley Manufacturing Co., Milwaukee, Wis.
Carrier Air Conditioning Co. of America, Buffalo, N. Y.
Carrier Engineering Co., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
New York Blower Co., Chicago, Ill.
Spray Engineering Co., Boston, Mass.
Sturtevant Co., B. F., Hyde Park, Mass.

OIL BURNERS

Aetna Automatic Burner Co., Providence, R. I.
American Nokol Co., Chicago, Ill.
Automatic Burner Corp., Chicago, Ill.
Ideal Rotary Burner Co., York, Pa.
Johnson Co., S. T., Oakland, Cal.
Rayfield Mfg. Co., Chicago, Ill.

OZONE APPARATUS.

United States Ozone Co., Scottdale, Pa.

PIPE.

Cast Iron.

Clow & Sons, Jas. B., Chicago, Ill.

Steel.

National Tube Co., Pittsburgh, Pa.

Wood.

Wyckoff & Sons Co., A., Elmira, N. Y.

PIPE BENDING.

Badger & Sons Co., E. B., Boston, Mass.
Buffalo Forge Co., Buffalo, N. Y.
Grinnell Company, Providence, R. I.
National Pipe Bending Co., New Haven, Conn.
Whitlock Coil Pipe Co., Hartford, Conn.

PIPE CASING (Wood).

American District Steam Co., No. Tonawanda, N. Y.
Wyckoff & Sons Co., A., Elmira, N. Y.

PIPE HANGERS.

Grinnell Company, Providence, R. I.
Jenkins Bros., New York.

PIPE, POWER.

Grinnell Company, Providence, R. I.

PUMPS.

Centrifugal.

American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Wheeler Condenser & Engineering Co., Carteret, N. J.
Yeomans Bros. Co., Chicago, Ill.
Young Pump Co., Michigan City, Ind.

Condensation.

American Steam Pump Co., Battle Creek, Mich
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Wright-Austin Co., Detroit, Mich.
Yeomans Bros. Co., Chicago, Ill.

Rotary.

Nash Engineering Co., So. Norwalk, Conn.

Steam.

American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Nash Engineering Co., So. Norwalk, Conn.

Turbine.

Nash Engineering Co., So. Norwalk, Conn.
Wheeler Condenser & Engineering Co., Carteret, N. J.
Yoemans Bros., Chicago, Ill.

Vacuum.

American Steam Pump Co., Battle Creek, Mich.
Bishop & Babcock Co., Cleveland, Ohio.
Chicago Pump Co., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Elliott Co., Jeannette, Pa.
McAlear Mfg. Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Skidmore Corp., Chicago, Ill.
Trane Co., La Crosse, Wis.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Yeomans Bros., Chicago, Ill.
Young Pump Co., Michigan City, Ind.

RADIATOR HANGERS.

Frank Radiator Bracket Co., Chicago, Ill.
Gloeckle, Jr., A. F., Rochester, N. Y.
Grinnell Company, Providence, R. I.
Hartmann Co., Charles, Brooklyn, N. Y.
Healy-Ruff Co., Minneapolis, Minn.
Pierce, Butler & Pierce Mfg. Co., New York.

RADIATORS.

"Gasteam."

James B. Clow & Sons, Chicago, Ill.

"Gaswater."

Clow & Sons, Jas. B., Chicago, Ill.

RADIATORS, STEAM AND WATER.

Aerofin Corp., Newark, N. J.
American Radiator Co., Chicago, Ill.
International Heater Co., Utica, N. Y.
Gurney Heater Mfg. Co., Boston, Mass.
Lyon Products Co., Chicago, Ill.
Pierce, Butler & Pierce Mfg. Co., New York.
Standard Heater Co., Williamsport, Pa.

RECEIVERS.

Air.

American District Steam Co., No. Tonawanda, N. Y.
The Brownell Co., Dayton, Ohio.
Kieley & Mueller, Inc., New York.
Sterling Engineering Co., Milwaukee, Wis.

Condensation.

Chicago Pump Co., Chicago, Ill.
Davis Regulator Co., G. M., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Yeomans Bros., Chicago, Ill.

REGULATORS.

Boiler-Feed.

Kieley & Mueller, Inc., New York.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
National Regulator Co., Chicago, Ill.
Stickle Steam Specialties Co., Indianapolis, Ind.
Thrush & Co., H. A., Peru, Ind.
Wright-Austin Co., Detroit, Mich.

Damper.

American Dist. Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
American Radiator Co., Chicago, Ill.
Bishop & Babcock Co., Cleveland, Ohio.
Davis Regulator Co., G. M., Chicago, Ill.
Honeywell Heating Specialties Co., Wabash, Indiana.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Mueller Co., Decatur, Ill.
National Regulator Co., Chicago, Ill.
Nelson Co., H. W., Moline, Ill.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Powers Regulator Co., Chicago, Ill.
Simplex Heating Specialty Co., Inc., Lynchburgh, Va.
Sterling Engineering Co., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind.
Thrush & Co., H. A., Peru, Ind.
Trane Co., La Crosse, Wis.
L. J. Wing Mfg. Co., New York.

Pressure.

American District Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Foxboro Co., Inc., The Foxboro, Mass.
Honeywell Heating Specialties Co., Wabash, Indiana.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Minneapolis Heat Regulator Co., Minneapolis, Minn.
National Regulator Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Stickle Steam Specialties Co., Indiapapolis, Ind.
Thrush & Co., H. A., Peru, Ind.

Temperature.

American Radiator Co., Chicago, Ill.
Atlas Valve Co., Newark, N. J.
Bishop & Babcock Co., Cleveland, Ohio.
Carrier Engineering Corporation, Newark, N. J.
Elliott Co., Jeannette, Pa.
Foxboro Co., Inc., The Foxboro, Mass.
Fulton Co., Knoxville, Tenn.
Gold Car Heating & Lighting Co., Brooklyn,
Honeywell Heating Specialties Co., Wabash, Indiana.
Hornung, J. C., Chicago, Ill.
Johnson Service Co., Milwaukee, Wis.
Kieley & Mueller, Inc., New York.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Minneapolis Heat Regulator Co., Minneapolis, Minn.
National Regulator Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Sarco Co., New York.

SEPARATORS.

Oil.

Elliott Co., Jeannette, Pa.
Griscom-Russell Co., New York.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Stickle Steam Specialties Co., Indianapolis, Ind.
Wright-Austin Co., Detroit, Mich.

Steam.

American District Steam Co., No. Tonawanda, N. Y.
Bishop & Babcock Co., Cleveland, Ohio.
Elliott Co., Jeannette, Pa.
Griscom-Russell Co., New York.
Illinois Engineering Co., Chicago, Ill
McAlear Mfg. Co., Chicago, Ill.
Patterson-Kelley Co., New York.
Sims Co., Erie, Pa.
Stickle Steam Specialties Co., Indianapolis, Ind.
Webster & Co., Warren, Camden, N. J.
Wright-Austin Co., Detroit, Mich.

SPRAY COOLING SYSTEMS.

Bayley Mfg. Co., Milwaukee, Wis.
Cooling Tower Co., New York.
Massachusetts Blower Co., Watertown, Mass
Seymour, James M., Newark, N. J.

SPRAY NOZZLES

(See Nozzles, Spray)

SPRINKLER HEADS

C. S. B. Sprinkler Co., Boston, Mass.

STOKERS

CombustiKator Co., Chicago, Ill.

STRAINERS.

Oi .

Elliott Co., Jeannette, Pa.
Griscom-Russell Co., New York.
Kieley & Mueller, Inc., New York.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.

Pipe

Spray Engineering Co., Boston, Mass.

Steam.

American Dist. Steam Co., No. Tonawanda, N. Y.
Dunham Co., C. A., Chicago, Ill.
Eliott Co., Jeannette, Pa.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Mason Regular Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Sarco Co., New York.
Sterling Engineering Co, Milwaukee, Wis.
Wright-Austin Co., Detroit, Mich.

Water.

American Dist. Steam Co., No. Tonawanda, N. Y.
Davis Regulator Co., G. M., Chicago, Ill.
Griscom-Russell Co., New York.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Sarco Co., New York.
Spray Engineering Co., Boston, Mass.

THERMOMETERS.

(Recording and Indicating).

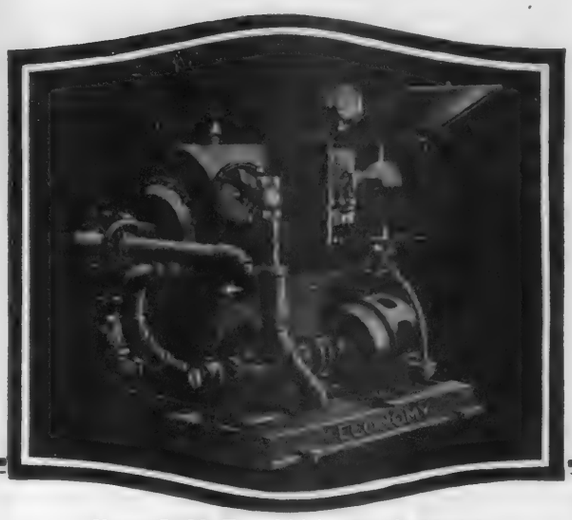
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., Waterbury, Conn.
Foxboro Co., Inc., The Foxboro, Mass.
Powers Regulator Co., Chicago, Ill.
Sarco Co., New York.

Water.

Marsh & Co., Jas. P., Chicago, Ill.
Pierce, Butler & Pierce Corp., New York.

THERMOSTATS.

American Radiator Co., Chicago, Ill.
Atlas Valve Co., Newark, N. J.
Bishop & Babcock Co., Cleveland, Ohio.
Fulton Co., Knoxville, Tenn.
Gold Car Heating & Lighting Co., Brooklyn,
Honeywell Heating Specialties Co., Wabash, Indiana.
Johnson Service Co., Milwaukee, Wis.
Klipfel Mfg. Co., Chicago, Ill.
Minneapolis Heat Regulator Co., Minneapolis, Minn.
Powers Regulator Co.. Chicago, Ill.



Type C. V. Fig. 2234—Single Model Vacuum Pumps

DEPENDABILITY

This is an essential requirement of all apparatus entering into the equipment of every worth while project.

Economy Centrifugal Vacuum Pumps

embody every requisite of high class equipment. They are well motored with ample reserve power. They never burn out, consequently shut downs are avoided.

They have ample air, water and pressure capacity.

They have longer life than other types.

They maintain their efficiencies.

They are scientifically designed.

They have the best thought of competent hydraulic and heating engineers built into them.

They require less attention and upkeep than other types.

They reduce noise in radiators and piping.

They operate quietly.

They use no more power than other pumps that do the same work.

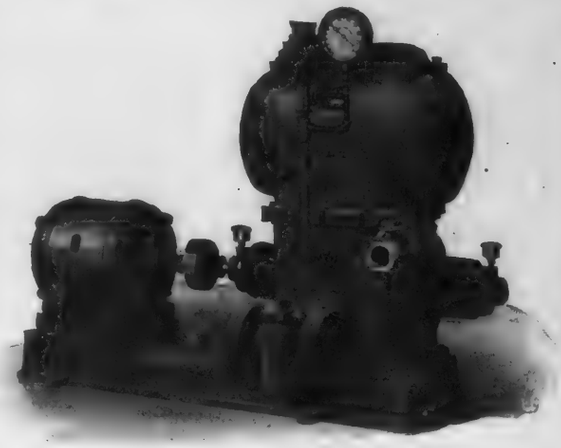
They are guaranteed for performance and quality.

Representatives in Every Large City

Economy Pumping Machinery Co.

71-122 North Curtis St. CHICAGO

SKIDMORE



The New Type "B"

THE Skidmore Hydro Turbine Vacuum and Boiler Feed Pump is now entering its fifth year.

Units that have been in service four heating seasons show the same efficiency that was shown when installed.

The new type offered retains all the advantages of those now in service, the change in design being in the casing to secure a more compact and sturdy unit.

All parts are of high grade cast iron or bronze, accurately machined.

There are no close clearances on moving parts and no piping is required to set the unit.

A self-contained unit all on one base.

Built in seven sizes for 10 to 60 lbs. pressure to handle 5,000, 8,000, 16,000, 26,000, 40,000, 65,000 and 100,000 sq. ft. of radiation for continuous service or with automatic control

SKIDMORE CORPORATION

General Offices and Factory

1535 Dayton St. CHICAGO, U. S. A.

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Sarco Co., New York.
Thrush & Co., H. A., Peru, Ind.

TRAPS.

Radiator.

Barnes & Jones, Boston, Mass.
Bishop & Babcock Co., Cleveland, Ohio.
Cashin Co., W. D. Boston, Mass.
Dunham, C. A., Co., Chicago, Ill.
Hoffman Specialty Co., New York.
Ideal Heating Equipment Co., Cleveland, Ohio.
Illinois Engineering Co., Chicago, Ill.
Johns-Manville, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Mouat Vapor Heating Co., Cleveland, O.
H. W. Nelson Co., Moline, Ill.
O-E Specialty Co., Milwaukee, Wis.
Sarco Co., New York.
Sterling Engineering Co., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind.
Trane Co., La Crosse, Wis.
Webster & Co., Warren, Camden, N. J.

Return.

American Blower Co., Detroit, Mich.
Barnes & Jones, Boston, Mass.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago Ill.
Johns-Manville, Inc., New York.
Kieley & Mueller, Inc., New York.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Mouat Vapor Heating Co., Cleveland, O.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Simplex Heating Specialty Co., Inc., Lynchburgh, Va.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., La Crosse, Wis.
Webster & Co., Warren, Camden, N. J.
Wright-Austin Co., Detroit, Mich.

Steam.

American Blower Co., Detroit, Mich.
American District Steam Co., No. Tonawanda, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Barnes & Jones, Boston, Mass.
Davis Engineering Co., New York.
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Dunham Co., C. A., Chicago, Ill.
Elliott Co., Jeannette, Pa.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Johns-Manville, Inc., New York.
Kieley & Mueller, Inc., New York.
Klipfel Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Patterson-Kelley Co., New York.
Sarco Co., New York.
Stickle Steam Specialties Co., Indianapolis, Ind.
Trane Co., La Crosse, Wis.
Wright-Austin Co., Detroit, Mich.

Vacuum.

American Blower Co., Detroit, Mich.
Bishop & Babcock Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Sarco Co., New York.
Sterling Engineering Co., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind.
Webster & Co., Warren, Camden, N. J.
Wright-Austin Co., Detroit, Mich.

TURBINES (Steam).

Buffalo Forge Co., Buffalo, N. Y.
Sturtevant Co., B. F., Hyde Park, Mass.
Westinghouse Elec. & Mfg. Co. East Pittsburgh, Pa.
L. J. Wing Mfg. Co., New York.

TURBO-BLOWERS.

Sturtevant Co., B. F., Hyde Park, Mass.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

UNDERGROUND PIPE CONDUITS.

American District Steam Co., No. Tonawanda, N. Y.
Hornung, P. C., Chicago, Ill.
Johns-Manville, Inc., New York.
Ric-Wil Co., Cleveland, O.
Wyckoff & Son, A., Elmira, N. Y.

VACUUM CLEANING APPARATUS.

American Radiator Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Mass.

VALVES.

Air (Automatic).

American Radiator Co., Chicago, Ill.
Commonwealth Brass Corporation, Detroit, Mich.
Fulton Co., Knoxville, Tenn.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Jenkins Bros., New York.
Kelly Brass Works, Chicago, Ill.
Klipfel Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Powers Regulator Co., Chicago, Ill.
Pierce, Butler & Pierce Corp., New York.

Air Relief.

American District Steam Co., No. Tonawanda, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Barnes & Jones, Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Fulton Co., Knoxville, Tenn.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
O-E Specialty Co., Milwaukee, Wis.
Powell Co., Wm., Cincinnati, O.
Scott Valve Mfg. Co., Detroit, Mich.
Sterling Engineering Co., Milwaukee, Wis.
Webster & Co., Warren, Camden, N. J.

Back Pressure.

Griscom-Russell Co., New York.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Scott Valve Mfg. Co., Detroit, Mich.
Stickle Steam Specialties Co., Indianapolis, Ind.

Balanced.

American District Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Scott Valve Mfg. Co., Detroit, Mich.
Stickle Steam Specialties Co., Indianapolis, Ind.

Blow-off.

Elliott Co., Jeannette, Pa.
Jenkins Bros., New York.
The Wm. Powell Co., Cincinnati, O.

Check.

Grinnell Company, Providence, R. I.
Jenkins Bros., New York.
Kennedy Valve Mfg. Co., Elmira, N. Y.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Powell Co., Wm., Cincinnati, O.
Scott Valve Mfg. Co., Detroit, Mich.

Float.

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Grinnell Company, Providence, R. I.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller Co., New York.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
Stickle Steam Specialties Co., Indianapolis, Ind.

Gate.

American District Steam Co., No. Tonawanda, N. Y.
Grinnell Company, Providence, R. I.
Jenkins Bros., New York.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Marsh Valve Co., Erie, Pa.
Milwaukee Valve Co., Milwaukee, Wis.
Powell Co., Wm., Cincinnati, O.
Scott Valve Mfg. Co., Detroit, Mich.

Globe, Angle and Cross.

Commonwealth Brass Corp., Detroit, Mich.
Grinnell Company, Providence, R. I.
Jenkins Bros., New York.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Marsh Valve Co., Erie, Pa.
Milwaukee Valve Co., Milwaukee, Wis.
Pierce, Butler & Pierce Corp., New York.
Powell Co., Wm., Cincinnati, O.
Powers Regulator Co., Chicago, Ill.
Scott Valve Mfg. Co., Detroit, Mich.

Hydraulic-Operating.

Atlas Valve Co., Newark, N. J.
Kieley & Mueller, Inc., New York.
Klippel Mfg. Co., Chicago, Ill.

Non-Return.

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Davis Regulator Co., G. M., Chicago, Ill.
Grinnell Company, Providence, R. I.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Powell Co., Wm., Cincinnati, O.

Radiator.

American Radiator Co., Chicago, Ill.
American District Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Co., Cleveland, Ohio.
Commonwealth Brass Corporation, Detroit, Mich.
Dunham Co., C. A., Chicago, Ill.
Fulton Co., Knoxville, Tenn.
Gorton & Lidgerwood Co., New York.
Honeywell Heating Specialties Co., Wabash, Indiana.
Ideal Heating Equip. Co., Cleveland, Ohio.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kennedy Valve Mfg. Co., Elmira, N. Y.
McAlear Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Marsh Valve Co., Dunkirk, N. Y.
Milwaukee Valve Co., Milwaukee, Wis.
Powell Co., Wm., Cincinnati, O.
Powers Regulator Co., Chicago, Ill.
Trane Co., La Crosse, Wis.
Scott Valve Mfg. Co., Detroit, Mich.
Simplex Heating Specialty Co., Inc., Lynchburg, Pa.
Sterling Engineering Co., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind.
Webster & Co., Warren, Camden, N. J.

Reducing.

American District Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Johnson Service Co., Milwaukee, Wis.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
Powell Co., Wm., Cincinnati, O.
Powers Regulator Co., Chicago, Ill.
Atlas Valve Co., Newark, N. J.

Regulating.

American District Steam Co., No. Tonawanda, N. Y.
Fulton Co., Knoxville, Tenn.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Powell Co., Wm., Cincinnati, O.
Powers Regulator Co., Chicago, Ill.

Relief (Water).

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
McAlear Mfg. Co., Chicago, Ill.
Powell Co., Wm., Cincinnati, Ohio.

Safety.

American District Steam Co., No. Tonawanda, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Jenkins Bros., New York.
Powell Co., Wm., Cincinnati, O.

Stop and Check.

(See Valves, Non Return).

VENTILATING HEATERS

Portable Unit.

American Blower Co., Detroit, Mich.
Buckeye Blower Co., Columbus, Ohio.
H. W. Nelson Co., Moline, Ill.
Nesbitt, John J., Inc., Atlantic City, N. J.
Peerless Unit Ventilating Co., New York.
Stickle Steam Specialties Co., Indianapolis, Ind.
Sturtevant Co., B. F., Hyde Park. Mass.
York Heating & Ventilating Co., Philadelphia, Pa.

(See also Heaters, Portable Unit Air).

VENTILATING SYSTEMS

American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corporation, Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Ilg Electric Ventilating Co., Chicago, Ill.
Massachusetts Blower Co., Watertown, Mass.
H. W. Nelson Co., Moline, Ill.
Nesbitt, John J., Inc., Atlantic City, N. J.
New York Blower Co., Chicago, Ill.
Peerless Unit Ventilating Co., New York.
Seymour, James M., Newark, N. J.
Skinner Bros. Mfg. Co., St. Louis Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg Co., New York.
York Heating & Ventilating Co., Philadelphia, Pa.

VENTILATORS.

Aeolus Dickinson Co., Chicago, Ill.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Ilg Electric Ventilating Co., Chicago, Ill.
New York Blower Co., Chicago, Ill.
Seymour, James M., Newark, N. J.
Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg. Co., New York.

Mushroom.

Aeolus Dickinson Co., Chicago, Ill.
Knowles Mushroom Ventilator Co., New York.
Lyon Products Co., Chicago, Ill.
New York Blower Co., Chicago, Ill.
Richmond Air Equipment Co., Richmond, Va.
Sturtevant Co., B. F., Hyde Park, Mass.
York Heating & Ventilating Co., Philadelphia, Pa.

WEATHER STRIPS.

Metal.

Athey Company, Chicago, Ill.
Chamberlin Metal Weather Strip Co., Detroit, Mich.
Higgin Manufacturing Co., Newport, Ky.

WELDING MATERIALS.

Linde Air Products Co., New York.
Oxweld Acetylene Co., Long Island City, N. Y
Prest-O-Lite Co., Inc., New York.

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AUTOMATIC ELECTRIC

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A thorough investigation of this pump will reveal the best material, the finest workmanship, resulting in a noiseless, rugged, reliable product that will give dependable service for many years.

For automatically returning condensation to boilers from low pressure gravity steam heating systems.

Also manufacturers of Bilge Pumps, Centrifugal Pumps, Sewage Ejectors, Sewage Pumps, etc.

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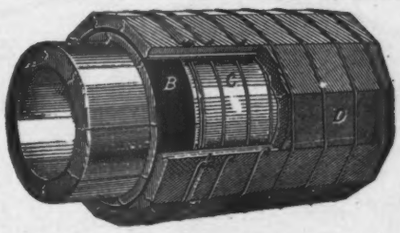

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Chicago Pumps *are right!*

SPECIAL conditions require special types of pumps.

Rather than furnish a make-shift outfit, we refrained from offering our Vertical Condensation Pump until we had developed a unit that would do its work thoroughly and dependably. The varying temperatures of waters handled by the Condensation Pump make it unwise to use any but a specially designed outfit.

The Vertical Condensation Pump pictured above, is especially adaptable where return lines are below the floor level. The pump pit with its objectionable features, flooding, inaccessibility, etc., are completely eliminated and a great amount of floor space is saved.

The outfit is self-contained and assembled properly so that steam leaks are eliminated. Special oilless bearings are used which withstand excessive hot water and no lubrication for long periods. The float mechanism in the stuffing box is guaranteed not to stick.

Bulletin No. 133 describes this outfit in detail and gives a complete table of capacities and pressures.

In addition to the Vertical Condensation Pump, we manufacture a complete line of horizontal condensation pumps in capacities up to 150,000 sq. ft. direct radiation and for pressures up to 200 lbs.

Chicago Pump Co.
Quality Centrifugal Pumps
2325 Wolfram St., Chicago, Ill.

H&V-12-25-RM

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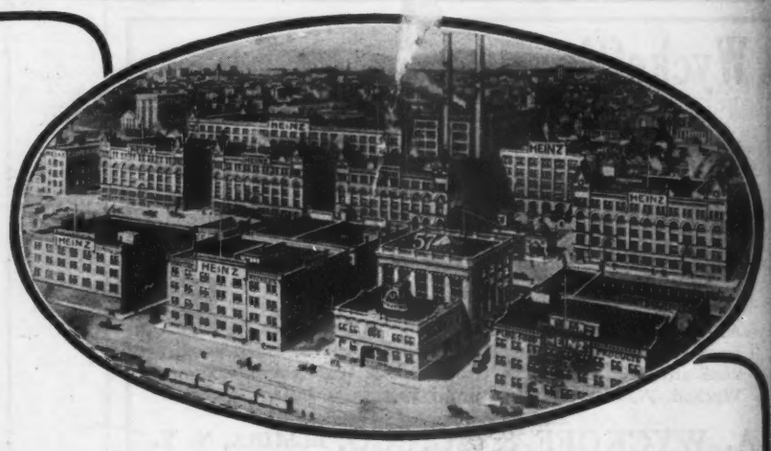
The same bigness of vision, sound judgment and keen buying sense that have made the H. J. Heinz Co. the biggest of its kind, enabled these people to realize that Patterson Hot Water Heaters would give them the most efficient and longest service.



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